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LEVEL II

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OHIO RIVER BASIN  
TRIBUTARY TO GUYS RUN  
ALLEGHENY COUNTY

PENNSYLVANIA

NDI No. PA 00835

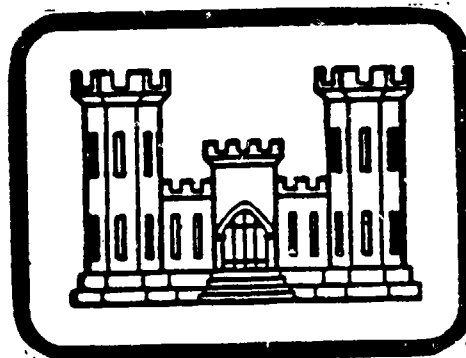
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HARMAR REFUSE BANK

HARMAR COAL COMPANY

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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM



PREPARED FOR

DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT, CORPS OF ENGINEERS  
BALTIMORE, MARYLAND 21203

BY

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Contract DACW31-81-C-0027

JULY 1981

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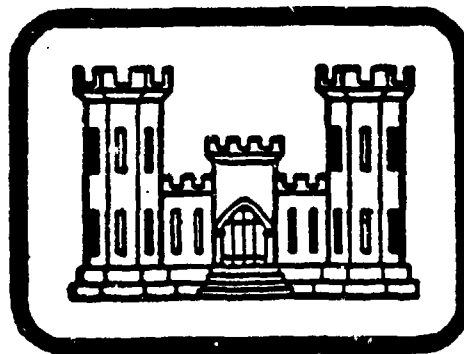
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HARMAR REFUSE BANK  
ALLEGHENY COUNTY, COMMONWEALTH OF PENNSYLVANIA  
NDI NO. PA 00835  
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HARMAR COAL COMPANY

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM



Prepared for: DEPARTMENT OF THE ARMY  
Baltimore District, Corps of Engineers  
Baltimore, Maryland 21203

Prepared by: ACKENHEIL & ASSOCIATES GEO SYSTEMS, INC.  
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Date: July 1981

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## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, materials testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some time in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" (PMF) for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS

NAME OF DAM: Harmar Refuse Bank  
STATE LOCATION: Pennsylvania  
COUNTY LOCATION: Allegheny  
STREAM: Unnamed tributary to Guy's Run  
DATE OF INSPECTION: 7 May 1981  
COORDINATES: Lat. 40°32'39"  
Long. 79°50'48"

ASSESSMENT

Based on a review of available information, visual observations of conditions as they existed on the date of the field inspection and supporting engineering analysis, the general condition of the Harmar Refuse Bank is considered to be fair.

This assessment is based primarily on visual observations of embankment, slope and seepage conditions and lack of knowledge of embankment material and ground water conditions.

The structure is classified as a "large" size, "high" hazard dam. Corps of Engineers guidelines recommend the Probable Maximum Flood (PMF) as the Spillway Design Flood for a "large" size, "high" hazard dam. The Harmar Refuse Bank's Spillway Design Flood is the Probable Maximum Flood and the impoundment capacity was found to be well in excess of the PMF.

The Phase I investigation of Harmar Refuse Bank revealed deficiencies and conditions which should be corrected or improved through implementation of the following recommended investigative, improvement and monitoring efforts.

RECOMMENDATIONS

1. Additional Investigations: It is recommended that the owner immediately perform an evaluation of the stability of Harmar Refuse Bank. This work should be performed under the direction of a registered professional engineer, knowledgeable and experienced in the design and construction of earth dams, and should include an evaluation of embankment material and groundwater conditions and stability analyses if deemed necessary.

2. Embankment Improvements: The owner should continue to implement the reclamation program that has been pursued to

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)  
Harmar Refuse Bank

date. In addition, a surface drainage plan should be developed that corrects those conditions that are now contributing to erosion, sedimentation, and ponding on the crest and downstream slope.

3. Monitoring of Springs and Seepage Zones: The springs and seepage zones should be monitored at frequent intervals for changes in water quality and quantity. If one does not now exist, the owner should develop and implement a regularly scheduled monitoring program with appropriate records to indicate possible long-term changes in seepage conditions.

4. Emergency Operation and Warning Plan: The owner should develop an Emergency Operation and Warning Plan including:

(1) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(2) Procedures for around-the-clock surveillance during periods of heavy precipitation or runoff.

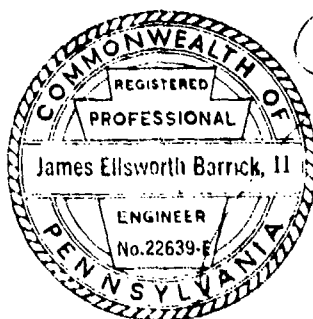
(3) Procedures for removal of standing water in the reservoir under emergency conditions.

(4) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

5. Maintenance and Inspection Procedure: The owner should develop written maintenance and inspection procedures in the form of checklists and step-by-step instructions.

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)  
Harmar Refuse Bank

Samuel G. Mazzella 17 July 1981  
Samuel G. Mazzella Date  
Project Engineer



James P. Hannan 17 July 1981  
James P. Hannan Date  
Project Engineer

James E. Barrick 17 July 1981  
James E. Barrick, P.E. Date  
PA Registration No. 022639-E

Approved by:

James W. Peck  
JAMES W. PECK  
Colonel, Corps of Engineers  
Commander and District Engineer

11 Aug 81  
Date

# HARMAR REFUSE BANK



OVERVIEW

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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
HARMAR REFUSE BANK  
NATIONAL I. D. NO. PA 00835  
PennDER No. 2-53

SECTION 1  
PROJECT INFORMATION

1.1 GENERAL

a. Authority: The Phase I investigation was performed pursuant to authority granted by Public Law 92-367 (National Dam Inspection Act) to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose: The purpose of the investigation is to make a determination on whether or not the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Dam and Appurtenances:

(1) Embankment: The Harmar Refuse Bank is a coarse and fine coal refuse disposal facility for the Harmar Mine and Preparation Plant located a half mile to the south.

The impounding embankment crest is about 900 feet long and the toe to crest height is 410 feet. The embankment's upstream slope is approximately 3.4H:1V. The downstream slope ranges from 11.5H:1V near the crest to 2.0H:1V at the toe.

(2) Spillways: The slurry impoundment has no spillways to maintain the reservoir pool level and provide for discharge of storm flows.

(3) Downstream Conditions: Guy's Run channel is located immediately below the downstream toe of the Refuse Bank. About one-half mile downstream, Guy's Run enters the Allegheny River at Harmarville, Pennsylvania.

(4) Reservoir: The reservoir impounded by the Harmar Refuse Bank was about 2000 feet long at the time of the inspection. When the reservoir level is at the crest of the impounding embankment, the pool will be 2,400 feet long.

(5) Watershed: The watershed contributing to the Harmar Refuse Bank, 90 acres, is two thirds woodland; the impoundment zone is the other third.

b. Location: The Harmar Refuse Bank is located on an unnamed tributary to Guy's Run in Harmar Township, Allegheny County, Pennsylvania, approximately one mile north of Harmarville, Pennsylvania.

c. Size Classification: The embankment has a maximum toe to crest height of 410 feet. The maximum storage capacity impounded by the embankment is 1710 acre-feet. Based on this data, the Harmar Refuse Bank is classified as a "large" size structure.

d. Hazard Classification: Harmar Refuse Bank is classified as a "high" hazard dam. In the event of a dam failure, at least five single family and several multi-family dwellings, State Route 28, and a main rail line could be subjected to substantial damage, and loss of more than a few lives could result.

e. Ownership: Harmar Refuse Bank is owned by the Harmar Coal Company, Harmarville, Pennsylvania. Inquiries concerning the dam should be addressed to:

Harmar Coal Company  
c/o Consolidation Coal Company  
Eastern Region  
450 Racetrack Road  
Washington, PA 15301  
Attention: Mr. Marshall Hunt, Divisional Manager of  
Engineering and Environmental Quality Control  
(412) 746-3400

f. Purpose of Dam: Harmar Refuse Bank was constructed as a disposal area for coarse and fine coal refuse from the Harmar Mine and Preparation Plant. to 13

g. Design and Construction History: The embankment and impoundment were constructed by Harmar Coal Company personnel beginning in 1957. Construction was halted in June 1980 with the shutdown of the Harmar Mine.

h. Normal Operating Procedure: Harmar Refuse Bank was designed to operate as an uncontrolled structure. Under normal operating conditions, fine coal refuse slurry was discharged to the impoundment for settling and disposal. Clarified water was returned by pump to the preparation plant for reuse in the coal cleaning process.

Concurrently, coarse coal refuse was placed on the existing embankment crest and the downstream portion of the impoundment zone to raise the embankment crest elevation. The impoundment zone was kept large enough to accommodate the runoff from large precipitation events so that a spillway was not necessary.

### 1.3 PERTINENT DATA

- a. Drainage Area 0.14 sq. mi.
- b. Discharge
- |  |         |
|--|---------|
| Maximum Flood at Dam Facility          | Unknown |
| Spillway Capacity at Top of Embankment | None    |
- c. Elevation (feet above MSL)
- |                              |         |
|------------------------------|---------|
| Design Top of Embankment     | Unknown |
| Current Top of Embankment    | 1150+   |
| Pool at Time of Inspection*  | 1100+   |
| Maximum Tailwater            | Unknown |
| Downstream toe of Embankment | 740+    |
- d. Reservoir Length
- |                            |           |
|----------------------------|-----------|
| Maximum Pool               | 2400 feet |
| Pool at Time of Inspection | 2000 feet |
- e. Reservoir Storage
- |                            |                |
|----------------------------|----------------|
| Current Top of Embankment  | 1578 acre-feet |
| Pool at Time of Inspection | 146 acre-feet  |
- f. Reservoir Surface
- |                            |            |
|----------------------------|------------|
| Current Top of Embankment  | 42.1 acres |
| Pool at Time of Inspection | 15.1 acres |
- g. Embankment
- |                 |   |
|-----------------|---|
| Type            | Coarse Coal Refuse With Upstream Construction Over Fine Coal Refuse |
| Height          | 410 feet  |
| Crest Length    | 900 feet  |
| Crest Width     | 365 feet  |
| Slopes          |   |
| Downstream      | 11.5H:1V to 2.0H:1V   |
| Upstream        | 3.4H:1V   |
| Impervious Core | Unknown   |
| Grout Curtain   | Unknown   |
- h. Principal Spillway (Regulating Outlet)
- |      |      |
|------|------|
| Type | None |
|------|------|
- i. Emergency Spillway
- |      |      |
|------|------|
| Type | None |
|------|------|

\*Datum for field measurements as estimated from USGS topographic map.

## SECTION 2 ENGINEERING DATA

### 2.1 DESIGN

a. Design History: No information was found on the design of this structure.

b. Data Available: Data available for review included:

(1) The contents of PennDER files consisting of dam location information and a dam inventory form.

(2) Conversations with the Owner's representative during the field inspection on 7 May 1981.

### 2.2 CONSTRUCTION

a. Constructors: The dam was constructed by Harmar Coal Company personnel between 1952 and June, 1980.

b. Modifications: No information was available on formal modifications to the structure. Construction of the impounding embankment was approximately continuous between 1952 and June 1980, when the Harmar Mine was closed. The embankment was the principal coarse coal refuse disposal area for the Harmar Mine's coal preparation plant, and the impoundment was the principal disposal area for fine coal refuse.

Upstream construction methods were employed to raise the embankment and impoundment to their current height.

A rockfill buttress and seepage collection pond at the downstream toe of the embankment were observed during the field inspection. They appeared to be of recent construction (within the last several years).

Reclamation of embankment out slopes consisting of grading, topsoil placement and vegetation is proceeding in an upslope direction. The rate of this reclamation work could not be determined.

### 2.3 OPERATION

a. Dam: The dam was designed to operate without a dam tender and no operational data are available.

b. Spillways: There is no principal or emergency spillway at this facility.

c. Outlet Works: No outlet works was observed at this facility.

## 2.4 EVALUATION

a. Availability: Available information was obtained from the Pennsylvania Department of Environmental Resources and was supplemented by conversations with a representative of the Owner.

b. Adequacy: The available design information, supplemented by field inspections and engineering analyses presented in succeeding sections, is adequate for the purpose of this Phase I Inspection Report.

c. Validity: There appears to be no reason to question the validity of the very limited available engineering information.

### SECTION 3 VISUAL INSPECTION

#### 3.1 FINDINGS

a. General: The field inspection of Harmar Refuse Bank was performed on 7 May 1981 and consisted of:

(1) Visual observations of the crest and slopes, groins and abutments.

(2) Visual observations of the embankment's downstream toe area, including drainage features and surficial conditions.

(3) Transit stadia field measurements of relative elevations across the embankment slopes.

(4) Visual observations of the reservoir shoreline and watershed.

(5) Visual observations of downstream conditions and evaluation of downstream hazard potential.

The visual observations and measurements were made during periods when the reservoir was at normal operating level.

The visual observations checklist, field sketch and field section containing the observations and comments of the field inspection team are contained in Appendix A. Specific observations are illustrated on photographs in Appendix C. Detailed findings of the field inspection are presented in the following sections.

b. Embankment:

(1) Crest: The crest of the embankment was generally level in an overall sense but was locally quite irregular and contained numerous vehicle ruts, truck dumped material deposits and grading ridges. Numerous depressions were noted that appeared to be capable of ponding water. A pond approximately 20 feet across was observed near the center of the crest.

Randomly oriented drying cracks were observed at numerous locations on the crest and embankment slopes. A few tensional cracks were noticed near the junction of the upstream slope and crest; they appeared to be the result of instability due to lack of compaction of near surface materials. Some sinkholes were noted in this area which appeared to be the result of channeling of surface flows into uncompacted areas between soil masses.

The crest of the dam was generally higher toward the center of the structure and sloped gradually toward each abutment. Horizontally, the crest was approximately perpendicular to the axis of the valley.

The crest of the embankment was entirely unvegetated.

(2) Upstream Slope: The upstream slope appeared to consist of a heterogeneous mixture of soil, rock and coarse coal refuse materials placed in a random manner such that the slope was both locally and generally uneven and irregular. Numerous deep erosional gullies crossed the upstream slope.

The upstream slope was entirely unvegetated.

(3) Downstream Slope: The downstream face ranged from an unvegetated, relatively mild slope near the crest to a relatively steep, vegetated slope near the toe. An intermediate section consisted of a grassed, moderate slope.

The upper section of the embankment consists of barren, coarse coal refuse materials that are being reclaimed by grading to provide proper drainage, topsoil and ultimately vegetation for erosion and infiltration control. This upper portion of the downstream slope has suffered some erosional distress due to surface runoff and has considerable ponding potential for surface runoff flows.

No significant cracks, scarps or anomalous bulges indicative of detrimental embankment movement were observed anywhere on the upper portion of the downstream slope.

The central portion of the downstream slope consists of a reclaimed section of the refuse embankment that has been graded, topsoiled and vegetated. In general, the vegetation ranged from a few barren areas to large areas of uniformly vegetated slope. Some erosion of slopes, particularly near the abutments, has occurred with resultant sedimentation at locations on benches and in groin drainage channels.

A fairly large slough zone has developed in the central portion near the left abutment. The slough is characterized by tension cracks and a small scarp near the top of the slough and hummocky, colluvial soils emitting seeping water near the toe. The slough appeared to be of a surficial nature and did not appear to threaten the overall stability of the embankment.

No significant cracks, other scarps or bulges indicative of slope movement were observed anywhere else on the central portion of the downstream slope.



The lower portion of the downstream slope consists of a moderately steep section of embankment that appeared to be considerably older than the upper and central portions. Covering vegetation was considerably more mature and numerous small (2 to 3 inch) diameter trees were growing on this portion of the slope. Surface drainage in this area was less controlled than on the central portion and numerous erosion and sediment zones were observed.

A significant slough zone exists on the left side of the lower portion of the downstream slope. A scarp several feet high and hummocky, colluvial conditions were observed. Springs and seeps were emitting iron stained water and water was ponded at several points in the vicinity of the toe of the slough. Trees on this portion of the bench were noticeably tilted in an upstream direction.

A wooden flume is located on the lower slope near the center of the embankment. The flume is quite old and wood has deteriorated and rotted at several points. A considerable amount of seepage was discharging from beneath the flume at the flume's downstream end and considerable iron staining and deposition of fine materials were noted beneath and immediately below the flume.

Besides the slough zone described above, there were no other significant indications of embankment slope movement or displacement.

The downstream toe of the embankment consists of a rock fill buttress that has been placed against the older portion of the embankment and along the left abutment. The buttress is of relatively recent construction and was in good condition on the date of inspection. Surfaces were uniform and no cracks or displacements were observed.

At the immediate toe of the buttress, there is a seepage collection pond that contains a pump on a floating intake structure. On the date of inspection, the water level in the pond was quite low and two large springs were observed discharging to the collection pond through the rock fill of the toe buttress. The left spring was discharging approximately 50 gallons per minute of clear water through a heavily iron stained zone. The right spring was discharging approximately one gallon per minute from an iron stained zone and a white salt material was observed at and below the discharge.

c. Abutments:

(1) Left: The left abutment consists of a natural ridge line that bounds the impounding embankment from crest to toe. In the upper reaches, the abutment is grassed and wooded and was in generally good condition. No significant erosion or indications of slope instability were observed.

The junction of the abutment and embankment in this reach consists of the haul or access road from the transfer station to the crest of the dam. Some erosion has occurred in drainage ditches on each side of the road as a result of surface runoff from embankment and abutment slopes.

The lower left groin was relatively ill defined as a result of reclamation activities that have extended the embankment's central and lower portion onto the abutment. Minor and significant erosional gullies were observed in this area as a result of surface runoff over unvegetated to sparsely vegetated slopes. Some sediment was noted at several points along drainage channels.

A significant slough zone was observed on the lower left abutment immediately above the rock fill toe buttress. The slough was approximately 100 feet long and 30 feet high, contained a significant scarp at the head and hummocky, colluvial soils near the toe. The slough appeared to have been revegetated and gave no indication of recent movement.

A small slough with tension cracks and hummocky conditions and water seeping from the toe was observed at the toe of the left abutment, immediately beyond the left abutment rockfill buttress. The slough zone was small and gave no indication of posing a serious threat to the abutment or impounding embankment.

(2) Right: The right abutment consists of a natural ridge line that ranged from heavily wooded near the crest to barren in the central portion and to heavily wooded in the lower portions of the embankment.

The barren area is located adjacent to the upper portion of the downstream slope and appeared to be the result of excavation of soil and rock for construction and reclamation activities. Some erosion due to surface runoff and resultant sedimentation of eroded materials has occurred at and immediately below this portion of the abutment.

The lower right groin has suffered significant erosion due to surface runoff from embankment slopes and bench drains. At one point, near the lower central portion of the embankment, the erosion has reached a depth of 3 to 4 feet. Drainage channels below contain considerable sediment from the erosional activity.

A surface drainage channel crosses the lower portion of the right abutment and discharges to the seepage collection pond at the toe of the embankment. No significant erosion or sedimentation was observed.

A slough zone of moderate size containing a scarp, hummocky soil and considerable seepage discharge was observed on the right abutment adjacent to Guy's Run Road beyond the downstream limit of the impounding embankment. A concrete seepage collection trench was diverting seepage flows to a pump house for return to the seepage collection pond. Considerable iron staining was observed in the vicinity of the slump and ditch.

d. Seepage: Several springs and seepage zones were observed on and about the impounding embankment. Several of the seepage zones have been previously described in connection with slough zones and the seepage collection pond.

Four other springs were observed that were not associated with sloughs or the pond. The highest spring and associated seepage zone was observed just below the crest near the right groin of the embankment. Seepage was estimated at less than one-half gallon per minute and appeared to originate at a topographic low in a rock borrow area just above on the right abutment.

The second spring was observed in a deep erosional gully in the left central portion of the downstream slope near the access road. A seepage flow estimated at 1 to 2 gallons per minute clear water was discharging from a coarse coal refuse strata that was exposed in the erosional cut. The origin of the seepage may have been infiltration from a ponded area immediately above the erosional gully. A dike has been formed, apparently to collect surface water for erosion and sediment control.

The third spring is located on the central portion of the downstream slope adjacent to the right abutment. On the date of inspection, the spring was discharging one-half to one gallon per minute clear water into the right groin drainage channel. The origin of the spring flow could not be determined.

None of these three springs appeared to be indicative of a significant or serious groundwater problem within the embankment or abutments. There were no indications of an extensive groundwater reservoir within the embankment and there was no defined line of seepage or anomalous changes in vegetation in the central or upper portions of the embankment.

A fourth spring, not associated with sloughs or the seepage collection pond, was observed at the lower end of the wooden flume just above the rock fill toe buttress. The spring was discharging approximately one gallon per minute clear water but considerable deposition of fine materials was observed in the vicinity. These materials appeared to be the result of chemical activity rather than internal erosion of embankment soils. The spring discharge point was immediately adjacent to the slough on the lower downstream slope and the slough in the lower left abutment area.

e. Spillways: No spillways were observed on the date of inspection.

f. Reservoir:

(1) Slopes: Shoreline slopes around the perimeter of the reservoir were generally moderately steep to steep and were almost entirely wooded. There were no indications of significant shoreline instability or erosion on the date of inspection.

(2) Inlet Stream: Because of the location of the impoundment high in the watershed, there is no defined inlet stream.

(3) Sedimentation: The reservoir contains a considerable quantity of fine coal refuse sediment, particularly in the vicinity immediately behind the upstream slope of the embankment.

(4) Watershed: The watershed was observed to be as indicated by the most recent USGS topographic map. No significant new construction or mining activities were observed in the watershed. The watershed is almost entirely wooded, except for the impoundment zone.

g. Downstream Conditions:

(1) Downstream Channel: Harmar Refuse Bank has no downstream channel because it has no outlet facilities.

Guy's Run approaches the toe of the embankment from the south; and after passing beneath Guy's Run Road, approximately 100 feet below the toe of the embankment, turns sharply to the east and proceeds down the valley toward the Allegheny River.

(2) Floodplain Conditions: In the first 800 feet below the dam, there are at least five single family dwellings and several multi-family dwellings located in the Guy's Run valley at elevations low enough to possibly be affected should the dam fail.

3.2 EVALUATION

The following evaluations are based on the visual inspection performed on 7 May 1981.

a. Harmar Refuse Bank was functional on the date of inspection. Several deficiencies were observed, which included:

(1) An unvegetated crest, upstream slope, and portions of the downstream slope.

(2) Minor erosion of unvegetated portions of the dam, including some minor sinkhole development along the upstream side of the crest.

(3) Sloughing of embankment and abutment slopes and uncontrolled seepage, particularly in the lower portion of the dam.

(4) Poor surface drainage characteristics of crest and upper downstream slopes that appear to have resulted in infiltration and subsequent development of springs on the embankment slopes.

(5) Surface drainage deficiencies that have resulted in concentrated flows on benches and groins, resulting in erosion and subsequent deposition of sediments.

b. Spillways and Outlets: Harmar Refuse Bank had no observed spillways or outlets on the date of inspection. However, the apparent capacity of the impoundment zone would preclude the necessity of outlets for a structure that is monitored periodically.

c. Seepage: Several springs and seepage zones, many associated with slough zones, were observed on the embankment, particularly in the lower portions. There was no indication of a high ground water level in the upper or central portions of the embankment. Considerable movement of ground water in the lower portions is evident, but it could not be determined whether this condition is the result of a significant build-up of ground water behind the lower portion of the embankment or the result of drainage through perched and preferred subsurface channels.

d. Hazard Potential: Harmar Refuse Bank was assigned a "high" hazard potential rating. This rating is based on the observed height and impounding capacity of the pond and the downstream floodplain conditions, which included numerous inhabited dwellings and Guy's Run Road. Failure of the Harmar Refuse Bank could result in significant disruption of commercial activities and loss of more than a few lives could result.

## SECTION 4 OPERATIONAL FEATURES

### 4.1 PROCEDURE

When the facility was in use, the only operational features were the slurry inflow pipe and the pump return system. Fine coal refuse slurry was pumped from the Harmar Mine and Preparation Plant to an open channel on the upper left abutment where flow was by gravity to the impoundment zone for settling and disposal. Clarified water was returned to the preparation plant by a pump and pipeline system.

No spillways or permanent outlet works were employed.

### 4.2 MAINTENANCE OF DAM

The embankment and appurtenances are maintained by the Harmar Coal Company. Maintenance reportedly consists of periodically repairing eroded and sloughed areas and making miscellaneous repairs as necessary.

### 4.3 INSPECTION OF DAM

The Harmar Coal Company is required by the State of Pennsylvania to inspect the dam annually and make needed repairs.

The Harmar Coal Company is required by the Mining Safety and Health Administration (MSHA) to inspect the dam at least once every seven days and to make an annual report and certification of the dam.

### 4.4 WARNING PROCEDURE

There is no warning system and no formal emergency procedure to alert or evacuate downstream residents upon threat of a dam failure.

### 4.5 EVALUATION

The facility does not have an outlet works to draw down the pool in case of an emergency.

The maintenance program should be continued. However, there are no written operation, maintenance or inspection procedures, nor is there a warning system or formal emergency procedure for this dam. These procedures should be developed in the form of checklists and step by step instructions, and should be implemented as necessary.

SECTION 5  
HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

a. Design Data: The Harmar Refuse Bank has a watershed of about 90 acres, which is vegetated primarily by woodland. The watershed is about 3,000 feet long and 1,800 feet wide and has a maximum elevation of about 1,270 feet (MSL).

There are no spillways or permanent outlet works facilities.

There is no information available on the required spillway capacity at the time of this facility's construction.

No hydrologic calculations were found relating reservoir/spillway performance to the Probable Maximum Flood or fractions thereof.

b. Experience Data: Records are not kept of the impoundment level or rainfall amounts. There is no record or report of the embankment ever being overtopped.

c. Visual Observations: On the date of the field inspection, the pool elevation was about 50 feet below the embankment crest.

d. Overtopping Potential: Overtopping potential was investigated through the development of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir. The Corps of Engineers guidelines recommend the Probable Maximum Flood (PMF) as the SDF for "large" size, "high" hazard dams. Based on the size and hazard classification, the Harmar Refuse Bank has a Spillway Design Flood (SDF) of the PMF.

Hydrometeorological Report No. 33 indicates the adjusted 24 hour Probable Maximum Precipitation (PMP) for the subject site is 19.2 inches. No calculations are available to indicate whether the reservoir is sized to store a flood corresponding to the runoff from 19.2 inches of rainfall in 24 hours. Consequently, an evaluation of the reservoir was performed to determine whether the available storage capacity is adequate under current Corps of Engineers guidelines.



The Corps of Engineers, Baltimore District, has directed that the HEC-1 Dam Safety Version computer program be utilized. The program was prepared by the Hydrologic Engineering Center (HEC), U.S. Army Corps of Engineers, Davis, California, July 1978. The major methodologies and key input data for this program are discussed briefly in Appendix D.

The peak inflow to the Harmar Refuse Bank was determined by HEC-1 to be 510 cfs for a full PMF.

e. Adequacy: The available storage capacity of the impoundment was determined to be in excess of 100% of the PMF by HEC-1. According to Corps of Engineers' guidelines, the reservoir capacity of the Harmar Refuse Bank is "adequate" to store the inflow from a PMF event without overtopping the embankment.

## SECTION 6 STRUCTURAL STABILITY

### 6.1 AVAILABLE INFORMATION

- a. Design and Construction Data: No design documentation or calculations were available for review.
- b. Operating Records: There are no written operating records or procedures for this dam.
- c. Mining Activity: The Upper Freeport Coal Seam lies approximately 300 feet below the Refuse Bank and may have been deep mined. The Pittsburgh Coal Seam outcrops near the adjacent hilltops and has been generally removed by surface mining.
- d. Visual Observations: The field inspection disclosed several indications of potential slope instability, including embankment and abutment slough zones, uncontrolled embankment seepage and springs.

There was no visible "line of seepage" and no marked vegetal changes suggesting a general groundwater reservoir within the embankment. However, the source or origin of springs and seepage in the lower portion of the downstream slope and abutments could not be determined. Neither could the extent of the groundwater reservoir be determined.

The overall slope of the lower portion of the downstream face was measured to be 2.7H:1V. In the central portion, the slope was measured to be 3.5H:1V and on the upper portion, the slope was 11.5H:1V.

No surficial evidence of mine subsidence was observed in the vicinity of the Refuse Bank.

- e. Performance: No reports of problems with the performance of this embankment over its lifetime were available for review.

The existence of a recently placed rock fill buttress on the downstream toe and left abutment slope suggests that concern for embankment stability may have existed in the recent past.

### 6.2 EVALUATION

- a. Design Documents: No design documentation was available to evaluate the structure.

b. Embankment: Based on the results of the visual observations of embankment slopes, materials and groundwater conditions, there appeared to be insufficient information to evaluate the stability of the embankment.

This is based on observations of local slope instability at several places on the downstream slope, uncontrolled seepage and springs at lower elevations and a lack of knowledge of embankment construction procedures, particularly lack of knowledge of the location and structural condition of fine coal refuse sediments within the embankment.

The overall slope of the lower portion of the downstream face may or may not have an adequate margin of safety for certain embankment material and groundwater conditions.

c. Seismic Stability: According to the Seismic Risk Map of the United States, the Harmar Refuse Bank is located in Zone 1 where damage due to earthquakes would most likely be minor.

A dam located in Seismic Zone 1 may be assumed to present no hazard from an earthquake, provided static stability conditions are satisfactory and conventional safety margins exist. Since there is concern regarding the static stability of the Refuse Bank, the seismic stability is questionable and should be assessed as part of the investigations recommended in Section 7.

## SECTION 7 ASSESSMENT AND RECOMMENDATIONS

### 7.1 ASSESSMENT

#### a. Evaluation:

(1) Embankment: The Harmar Refuse Bank is considered to be in fair condition. This assessment is based primarily on visual observations of the embankment's downstream slope that revealed slough zones and uncontrolled seepage and springs; the origin of these conditions could not be determined. Also, surface drainage conditions are deficient at several locations, as indicated by observed erosion and sedimentation, ponding, and depressions where ponding can occur.

(2) Impoundment Capacity: The impoundment capacity was found by HEC-1 to be "adequate" for the Refuse Bank's size and hazard classification. The Spillway Design Flood for the Refuse Bank is the Probable Maximum Flood (PMF) and the impoundment capacity was found to be well in excess of the PMF.

(3) Emergency Plans: The lack of a documented emergency operation and warning plan is considered to be a deficiency.

Also, the lack of a facility or plan for drawing down the impoundment zone in case of an emergency is considered to be a deficiency.

b. Adequacy of Information: The information available on design, construction, operation and performance history in combination with visual observations and hydrology and hydraulic calculations was sufficient to evaluate the embankment and appurtenant structures in accordance with the Phase I investigation guidelines.

c. Urgency: The recommendations presented in Section 7.2 should be implemented immediately.

d. Necessity for Further Studies: Additional engineering information is required to adequately evaluate the structural stability of the Harmar Refuse Bank.

### 7.2 RECOMMENDATIONS

a. Additional Investigations: It is recommended that the owner immediately perform an evaluation of the stability of the Harmar Refuse Bank. This work should be performed under the direction of a registered professional engineer who is knowledgeable and experienced in the design and construction of

earth dams, and should include an evaluation of embankment material and groundwater conditions and stability analyses if deemed necessary.

b. Embankment Improvements: The owner should continue to implement the reclamation program that has been pursued to date. In addition, a surface drainage plan should be developed that corrects those conditions that are now contributing to erosion, sedimentation, and ponding on the crest and downstream slope.

c. Monitoring of Springs and Seepage Zones: The springs and seepage zones should be monitored at frequent intervals for changes in water quality and quantity. If one does not now exist, the owner should develop and implement a regularly scheduled monitoring program with appropriate records to indicate possible long-term changes in seepage conditions.

d. Emergency Operation and Warning Plan: The owner should develop an Emergency Operation and Warning Plan including:

(1) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(2) Procedures for around-the-clock surveillance during periods of heavy precipitation or runoff.

(3) Procedures for removal of standing water in the reservoir under emergency conditions.

(4) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

e. Maintenance and Inspection Procedures: The owner should develop written maintenance and inspection procedures in the form of checklists and step-by-step instructions.

APPENDIX A  
VISUAL INSPECTION CHECKLIST

Name	Dan	Harman	Mine	County	Allegheny	State	Pennsylvania	National ID #	PA00835
------	-----	--------	------	--------	-----------	-------	--------------	---------------	---------

Type of Dam	Coarse Coal Refuse	Hazard Category	High
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Date(s)	Inspection	Weather	Clear, mild	Temperature	50°F
7 May 1981					

Pool Elevation at Time of Inspection 1,100 ± (MSL)

Inspection Personnel:	J. E. Barrick, P.E.	Ackenheil & Associates, Project Manager and Hydrologist
	J. P. Hannan	Ackenheil & Associates, Geotechnical Engineer
	S. G. Mazzella	Ackenheil & Associates, Civil Engineer
	D. Bayne	Owner's Representative
	H. Nagel	Owner's Representative

**Recorder J. E. Barrick**

GEO Project G80138-M  
Pennder I.D. No. 2-53

## EMBANKMENT

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
SURFACE CRACKS	<p>Randomly oriented drying cracks were observed at numerous locations on the crest, slopes, and abutments of the embankment.</p> <p>Deep drying cracks were observed in the sediment deposits in the impoundment zone.</p> <p>No cracking that might be suggestive of pending movement of soils or refuse materials was observed on the embankment or immediately adjacent abutments.</p>	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE.	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT SLOPES	<p>Two significant zones of embankment sloughing were observed on the downstream slope near the left groin. The lower slough zone was located immediately above the recently placed rock fill toe and was approximately 60 feet wide. Iron stained seepage was discharging from the toe of the slough area. A scarp, hummocky soil conditions and tilted trees were also observed.</p> <p>The upper seepage zone is located on the slope of a reclaimed portion of the embankment. The slough appears to be the result of near surface soils sliding down slope. A small scarp was observed at the top of the slough zone and hummocky, wet and seeping conditions were observed in the lower reach of the zone. Some erosion of embankment slopes has occurred above the slough zone.</p>	



## EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOUGHING OR EROSION OF ABUTMENT SLOPES	<p>A significant slough zone was observed on the embankment's left abutment near the toe of the embankment. The slough zone was approximately 100 feet long and 30 feet wide and contained a scarp near the top and a hummocky, colluvial zone near the toe. The area appears to have been cleared and revegetated in recent times and gave no appearance of recent movement.</p> <p>A small slough zone with small scarp and seeping water was observed at the immediate downstream toe of the left abutment. The slough zone occurred at the intersection of the original ground and the abutment rock buttress.</p> <p>A slough zone was observed in the natural hillside of the right abutment along Guy's Run Road. A concrete seepage collection trench has been constructed along the toe of the slope to divert iron laden seepage flows to a pump house for transfer into the seepage collection pond at the toe of the embankment. The slough appeared to be several years old and gave no indications of recent movement.</p>	
EROSION OF EMBANKMENT SLOPES	<p>Considerable erosion of embankment crest and slopes has taken place and is actively occurring at several locations. The most significant eroded areas occur in the groins of the embankment and the abutment. In particular, relatively deep erosional channels have developed along the embankment's right groin below the borrow area and at various locations along the lower embankment groin.</p>	

EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
EROSION OF EMBANKMENT SLOPES (CONT'D)	<p>Two erosional gullies have developed along the access road that lies in the left groin of the embankment. The gullies are particularly well developed near the lower central portion of the embankment at and above the area where flows are diverted around the hillside to other drainage courses.</p> <p>Minor erosional gullies were observed at numerous location on all portions of the embankment. Near the toe of the embankment, just above the rock fill toe buttress, older erosional gullies have cut deeply into the original embankment slopes in this area. Exposed materials include soil, broken rock, and coarse coal refuse materials.</p>	
EROSION OF ABUTMENT SLOPES	<p>No significant erosion of abutment slopes was observed on either side of the embankment. Some minor erosion of barren slope areas was noted particularly in areas where borrow excavations have occurred. The lower left abutment cannot be readily distinguished from the lower left embankment and some erosion was observed on the slope below the transfer station.</p>	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	<p>The crest of the dam was generally higher toward the center of the structure and sloped gradually toward each abutment. The crest was locally uneven and quite irregular and contained numerous vehicle ruts, truck-dumped material deposits and grading ridges. Because of the significant freeboard between the observed crest and both the water level and the older sediment deposits, a crest profile was not measured.</p>	

# EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST (CONT'D)	<p>An access road at the right groin of the crest was approximately 5 feet lower than the adjacent crest elevation, but this was blocked by an access road fill into the adjacent rock borrow area in the upper right abutment.</p> <p>The horizontal alignment of the crest was approximately perpendicular to the axis of the valley.</p>	
RIPRAP FAILURES	None observed.	
SETTLEMENT	None observed.	
JUNCTION OF EMBANKMENT AND RIGHT ABUTMENT (RIGHT GROIN)	<p>The lower right groin immediately above the rock fill toe was generally eroded and wet with some seepage observed. Erosion is actively progressing in this area.</p> <p>The middle groin area was dry and uneroded and appeared to be in good condition.</p> <p>The upper right groin area was barren and eroded but was generally dry on the date of inspection. No active seepage was observed in the vicinity of the upper right groin.</p>	

# EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND LEFT ABUTMENT (LEFT GROIN)	<p>The lower left groin of the embankment is relatively un- defined, as the embankment blends into the abutment as a result of recent reclamation work. Considerable erosion, some seepage and some slope instability was observed in the general groin area. These conditions have been discussed elsewhere. At the toe of the embankment, the groin between the rock toe buttress and the abutment was in good condition.</p> <p>The middle and upper groin is defined by the access road to the top of the embankment. Erosional gullies lie along both sides of the access road and become deeper in the downslope direction. Significant erosion has occurred on both sides of the road at a point approximately at the top of the lower slope of the embankment. At this point, a drainage channel has been constructed through the ridge line and flows are discharged to a different watershed. Little to no vegetation occurs in and about the groin of the upper and middle left.</p>	
ANY NOTICEABLE SEEPAGE	<p>Numerous wet zones, seeps and springs were observed on and about the embankment. Seeps and wet zones were observed in conjunction with several of the slough zones previously described. Three significant springs were observed on the middle portion of the embankment's downstream slope.</p> <p>The lowest was observed in the embankment slope near the right groin and was discharging approximately 1/2 to 1 gallon per minute clear water. The spring discharged to the groin and ultimately across one of the embankment's lower benches, where it infiltrated into the embankment before reaching the opposite abutment.</p>	

EMBANKMENT (CONTINUED)

VISUAL EXAMINATION OF ANY NOTICEABLE SEEPAGE (CONT'D)	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
	<p>A spring emanating from coarse coal refuse materials in an embankment erosional gully was observed just to the right of the access road in the left groin. Clear water was discharging from a coarse refuse strata at approximately one to two gallons per minute. The erosional gully discharged to the ditch along the right side of the access road, crossed beneath the access road through a 24 inch concrete pipe and proceeded around the drainage ditch on the left side of the access road.</p>	
	<p>A third spring was observed approximately at the junction of the embankment and abutment just below the crest of the embankment. Approximately 1/4 to 1/2 gallon per minute was seeping from an area of soft soils containing algal growth.</p>	
	<p>A fourth spring was observed discharging from beneath the wooden flume near the center of the lower portion of the embankment. The spring appeared to be long standing, contained considerable iron stainings and was discharging at approximately one gallon per minute on the date of inspection.</p>	
	<p>Two springs were discharging from the rock fill of the rock fill toe buttress within the limits of the seepage collection pond at the toe of the embankment. On the left, a large spring was discharging approximately 50 gallons per minute clear water from a heavily iron-stained zone. On the right, there was a discharge of approximately one gallon per minute. The discharge on the right, however, had deposits of white material immediately below the discharge point.</p>	

EMBANKMENT (CONTINUED)

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
UPSTREAM SLOPE	<p>The upstream slope of the embankment appeared to consist of a heterogeneous mixture of soil, rock and coarse coal refuse materials placed in a random manner such that the slope was locally and generally uneven and irregular. Numerous deep erosional gullies crossed the upstream slope.</p> <p>The alignment of the slope was approximately perpendicular to the axis of the valley.</p> <p>Some cracking and minor sinkhole developments were noted on the crest of the dam in the vicinity of the upstream slope.</p> <p>The sinkholes appeared to be the result of erosion by surface runoff into uncompacted areas of the fill.</p>	

## SPILLWAYS AND OUTLETS

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
<b>SPILLWAYS</b>	The main slurry impoundment has no principal or emergency spillway.	
<b>OUTLETS</b>	<p>When in operation, fine coal refuse slurry was pumped to the impoundment from the Harmar Mine and Preparation Plant below and allowed to fill the impoundment in an uncontrolled manner. Supernatant liquid was allowed to collect toward the north and west sides of the reservoir and was pumped back to the preparation plant for reuse in the coal cleaning process.</p> <p>On the date of inspection, numerous sections of 6-inch plastic pipe were observed in the vicinity of the right (west) groin of the embankment, but they were not connected and no pumping system or mechanism was observed.</p>	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEY	None observed.	
WEIRS	None observed.	
PIEZOMETERS	None observed.	
OBSERVATION WELLS	None observed.	

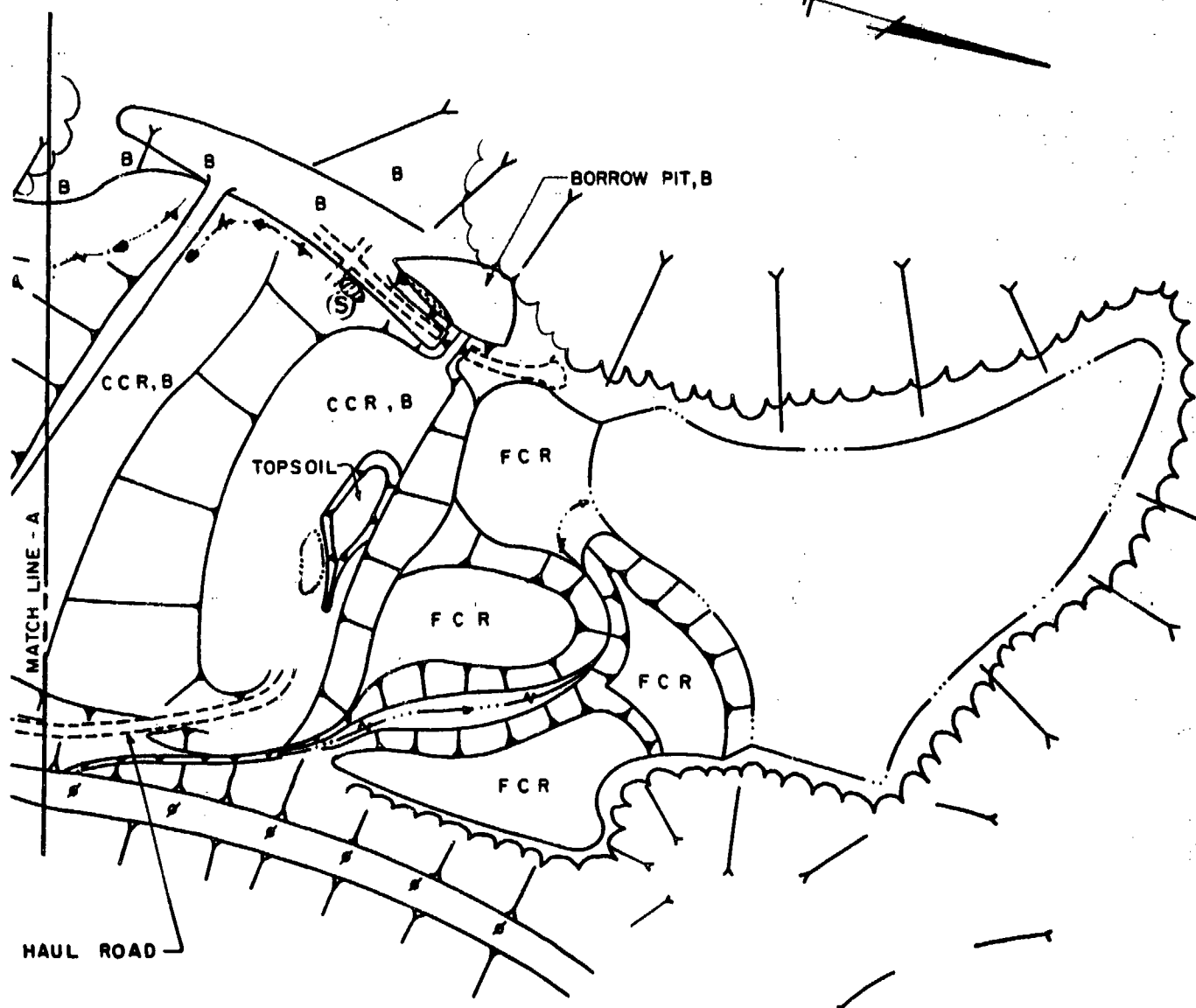


RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Shoreline slopes around the perimeter of the reservoir were generally moderately steep to steep and were almost entirely wooded. There were no indications of significant shoreline instability or erosion on the date of inspection.	
SEDIMENTATION	The reservoir contains a considerable quantity of fine coal refuse sediment particularly in the vicinity immediately behind the upstream slope of the embankment.	
INLET STREAM	Because of the location of the impoundment, high in the watershed, there is no defined inlet stream.	
WATERSHED	The watershed was observed to be as indicated by the most recent USGS topographic map. No significant new construction or mining activities were observed in the watershed. The watershed is almost entirely wooded.	

# DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The main slurry impoundment has no downstream channel because it has no outlet facilities.	
	Guy's Run approaches the toe of the embankment after passing beneath Guy's Run Road at a point approximately 100 feet below the toe of the embankment. Guy's Run turns sharply to the left and proceeds down valley toward the Allegheny River.	
APPROXIMATE NO. OF HOMES AND POPULATION	In the first 800 feet below the dam, there are at least five single-family and several multi-family dwellings located in the Guy's Run Valley at elevations low enough to possibly be affected should the dam fail.	

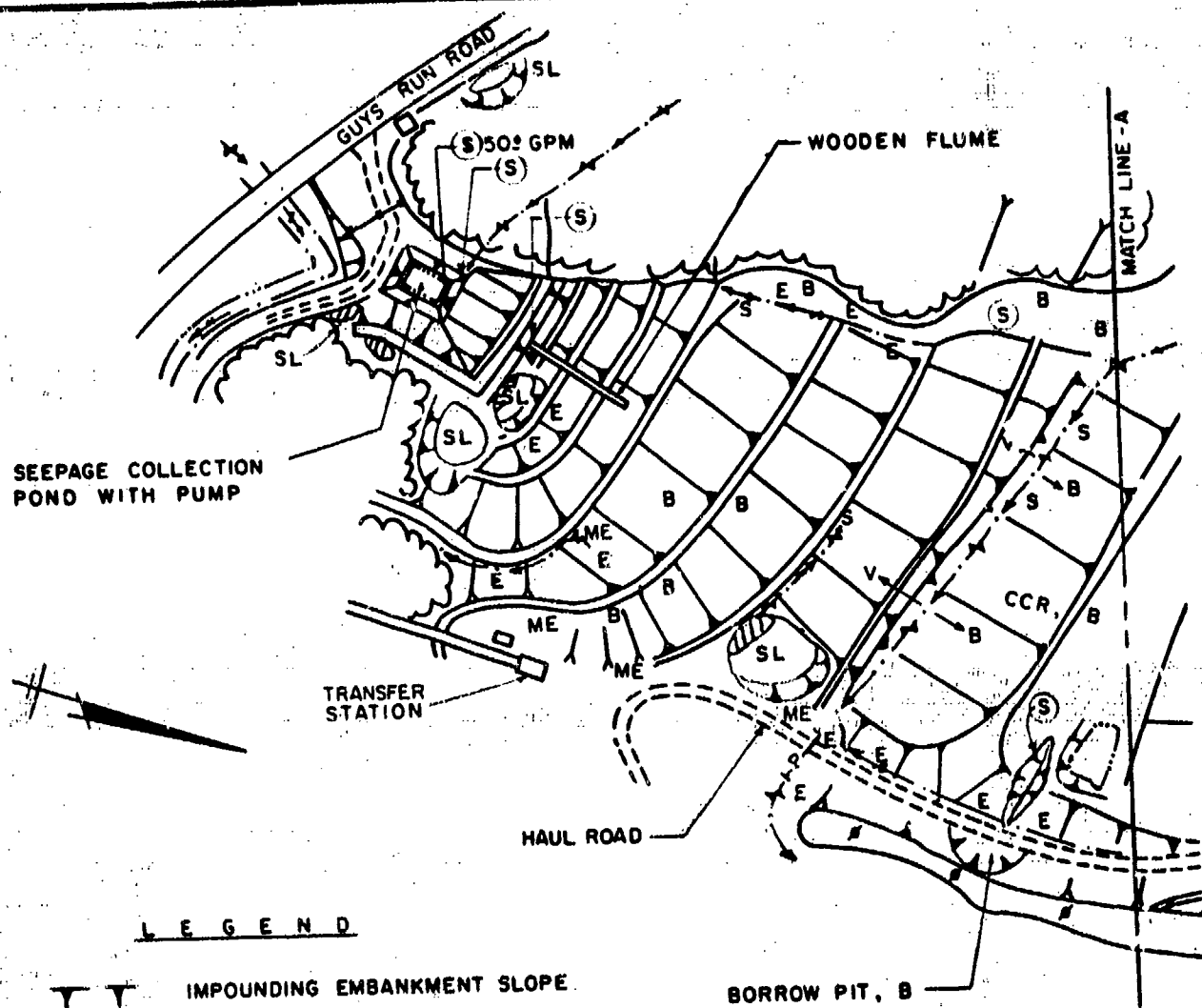


**PLAN**  
No Scale

SEE SHEET 2 of 2 FOR LEGEND

DATE: JULY 1981		HARMAR REFUSE BANK NATIONAL DAM INSPECTION PROGRAM		FIELD SKETCH  SHEET 1 OF 2	
SCALE: NONE					
DR: JF	CK: JEB	<b>ACKENHEIL &amp; ASSOCIATES</b> CONSULTING GEO SYSTEMS, INC. ENGINEERS 1000 BANKSVILLE RD./PITTSBURGH, PA. 15216			
DWG. NO. 80138 M-1					

PA 8717-878



### LEGEND

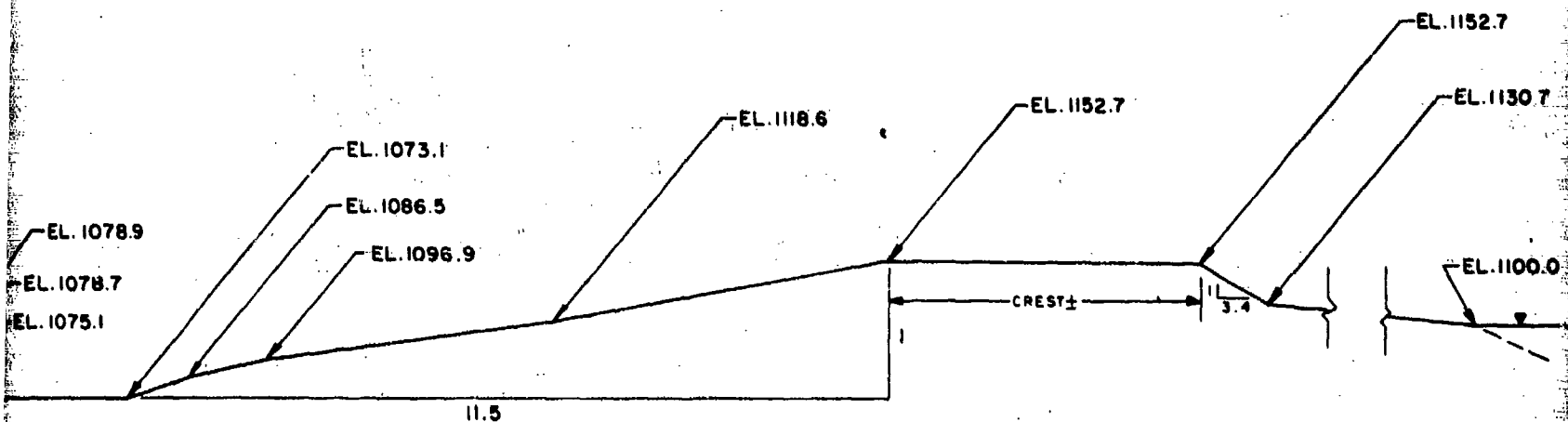
- IMPOUNDING EMBANKMENT SLOPE
- OTHER SLOPES
- CCR COARSE COAL REFUSE
- FCR FINE COAL REFUSE
- B, B BARREN
- V VEGETATED
- WOODS
- PIPE
- DEPRESSION
- UTILITY POLE
- STREAM OR SHORELINE
- SURFACE DRAINAGE COURSE
- ME MINOR EROSION
- E EROSION
- S SEDIMENT
- (S) SPRING
- SL SLOUGH ZONE
- SEEPAGE ZONE

### PLAN

No Scale

DATE: JULY 1981	HARMAR REFUSE BANK NATIONAL DAM INSPECTION PROGRAM	FIELD SKETCH
SCALE: NONE		
DR: JF CK: JEB	ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD., PITTSBURGH, PA. 15210	SHEET 2 OF 2
DWG. NO. 80138 M - 2		





# SECTION THROUGH EMBANKMENT

SCALE:  
 VERT. 1" = 100'  
 HORZ. 1" = 200'

DATE: JULY 1981		HARMAR REFUSE BANK NATIONAL DAM INSPECTION PROGRAM		FIELD SECTION
SCALE: AS SHOWN				
DR: JF	CK: JEB	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.		
DWG. NO. 80138 M - 3				

**APPENDIX B**  
**ENGINEERING DATA CHECKLIST**

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

NAME OF DAM Harmar Refuse Bank  
NDI No. PA 00835

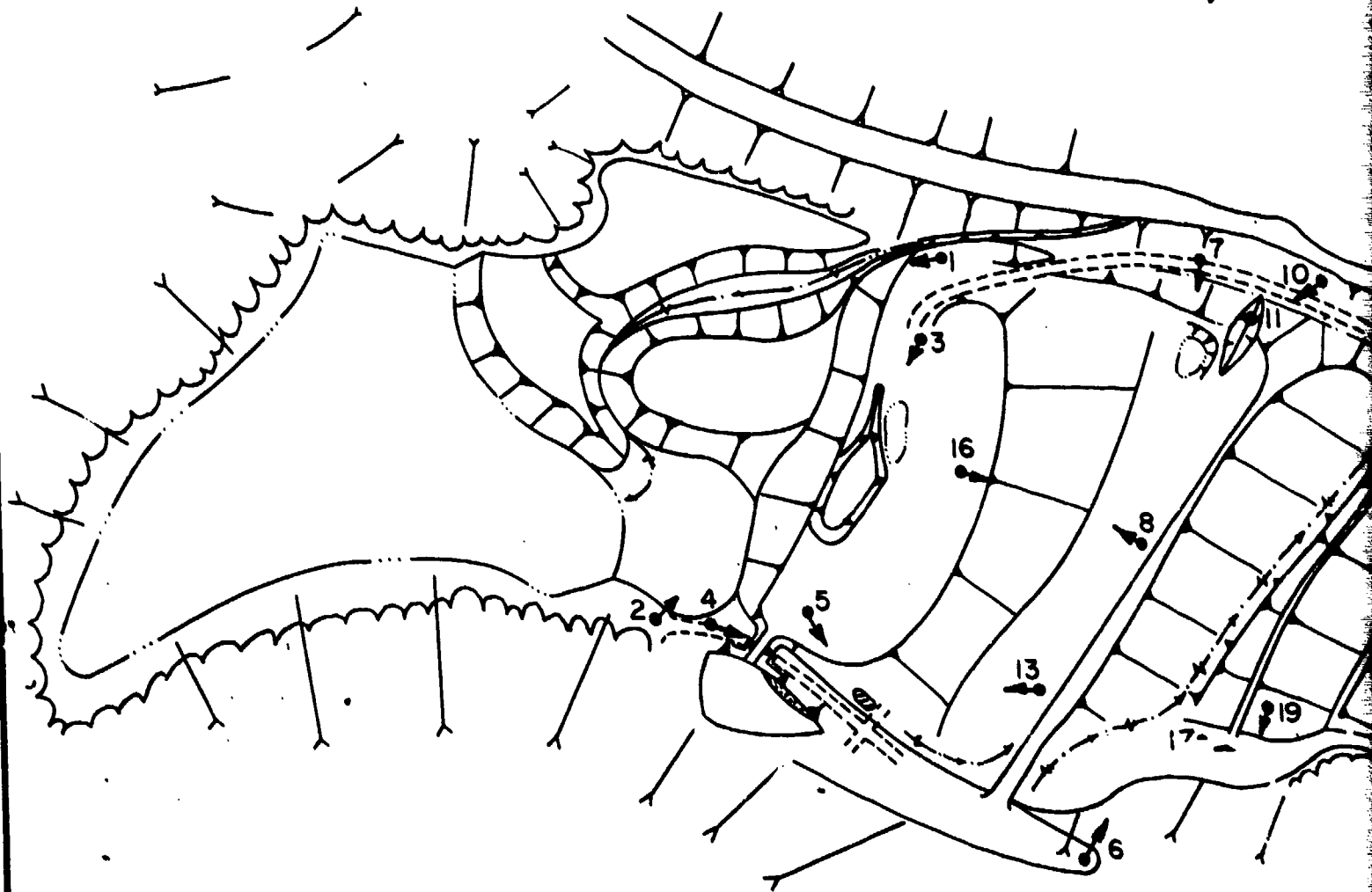
ITEM	REMARKS
Design Drawings	None available.
As-Built Drawings	None available.
Regional Vicinity Map	USGS 7-1/2 Minute New Kensington West, Pennsylvania Quadrangle Map.
*Construction History	Constructed by Harmar Coal Company personnel beginning in 1952. Constructed of coarse coal refuse materials from Harmar Coal Preparation Plant. Materials moved by aerial tram to a right abutment load out facility. Transfer to pans for placement on embankment.
Typical Sections of Dam	None available.
Outlets-Plans Details Constraints Discharge Ratings	None available.
Rainfall/Reservoir Records	None available.
Design Reports	None available.

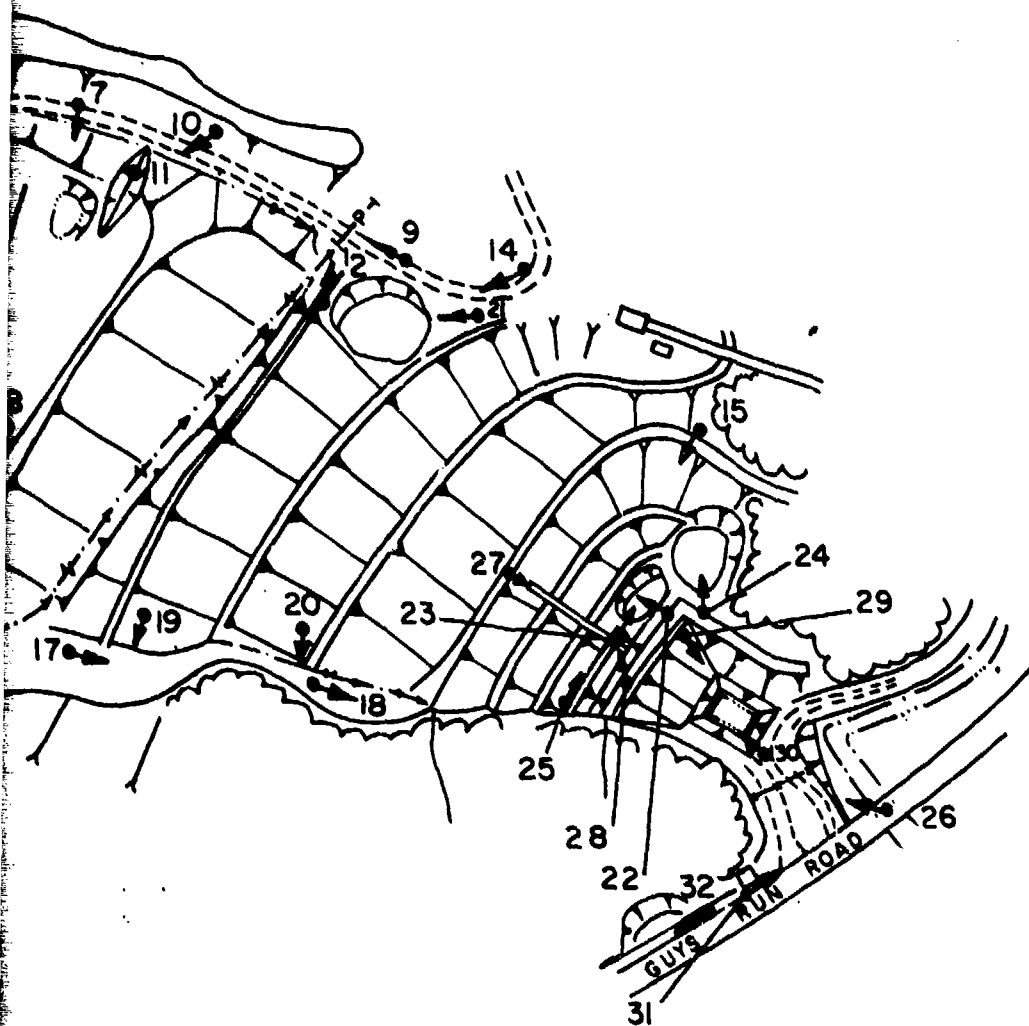


ITEM	REMARKS
Geology Reports	None available.
Design Computations	None available.
Hydrology and Hydraulics	None available.
Dam Stability	None available.
Seepage Studies	None available.
Materials Investigations, Boring Records, Laboratory, Field	None available.
Post-Construction Surveys of Dam	None recorded.
Borrow Sources	No information available.
Monitoring Systems	None reported.
Modifications	None reported.
High Pool Records	None available.

ITEM	REMARKS
Post-Construction Engineering Studies and Reports	None available.
Maintenance, Operation, Records	None available.
Spillway-Plan Sections Details	None constructed.
Operating Equipment Plans and Details	None available.
Specifications	None available.
Miscellaneous	None available.
Construction Reports	None available.
Prior Accidents or Failure of Dam Description Reports	None reported.
*Information provided by Harmar Coal Company personnel.	

APPENDIX C  
PHOTOGRAPHS

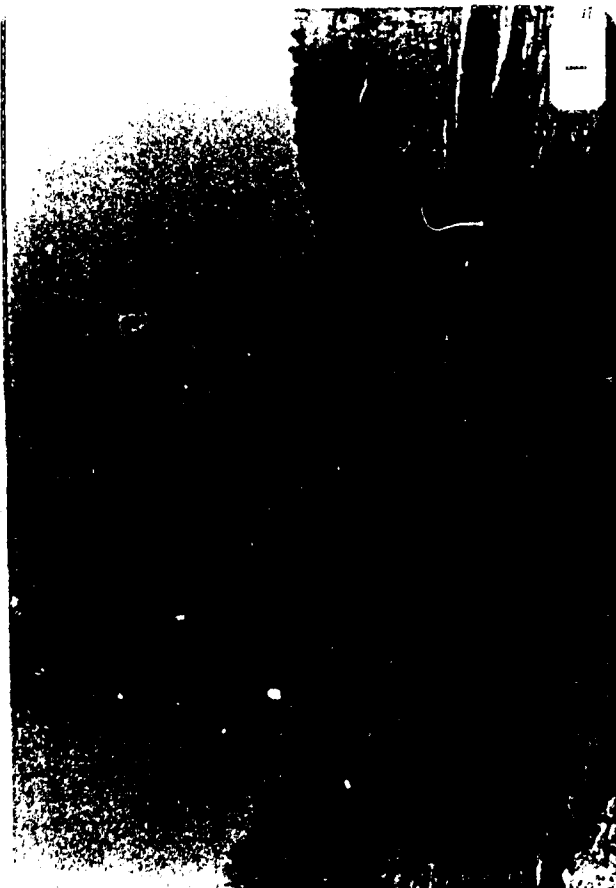




DATE: JULY 1981	<p>HARMAR REFUSE BANK NATIONAL DAM INSPECTION PROGRAM</p> <p><b>ACKENHEIL &amp; ASSOCIATES</b> CONSULTING ENGINEERS GEO SYSTEMS, INC. 1000 BANKSVILLE RD., PITTSBURGH, PA. 15216</p>	<p>PHOTO KEY MAP</p> <p><i>[Handwritten signature]</i></p> <p>PR 8919-016</p>
SCALE: NONE		
DR: JF CK: JEB		
DWG. NO. 80138M		

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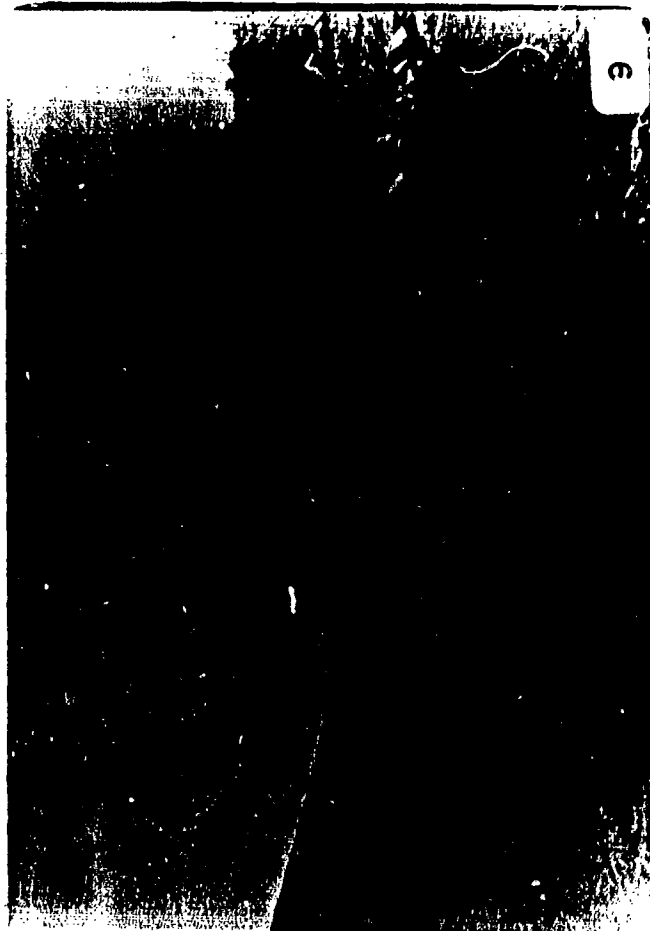
HARMAR REFUSE BANK



HARMAR REFUSE BANK



HARMAR REFUSE BANK

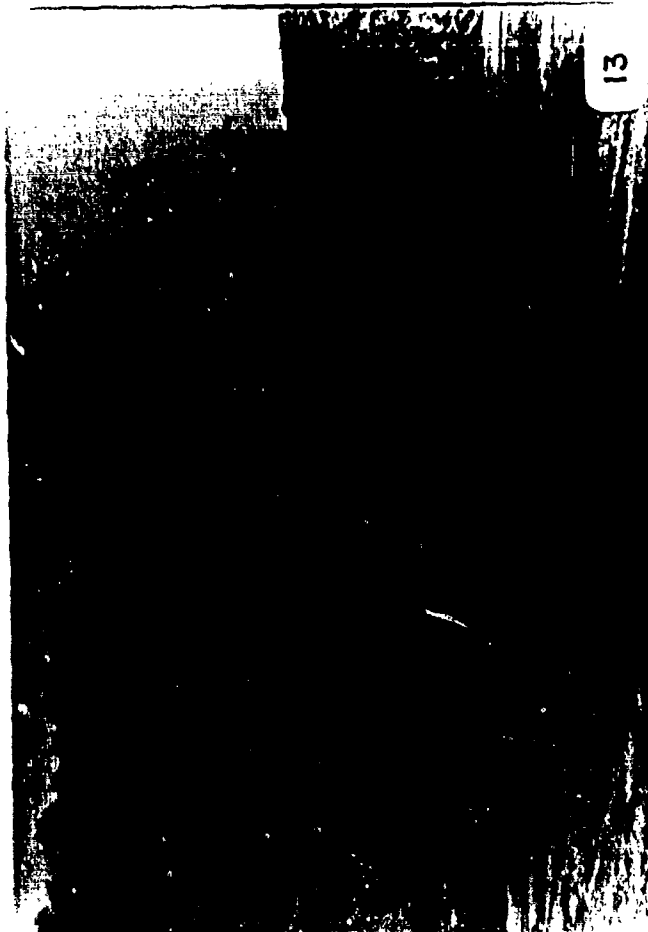




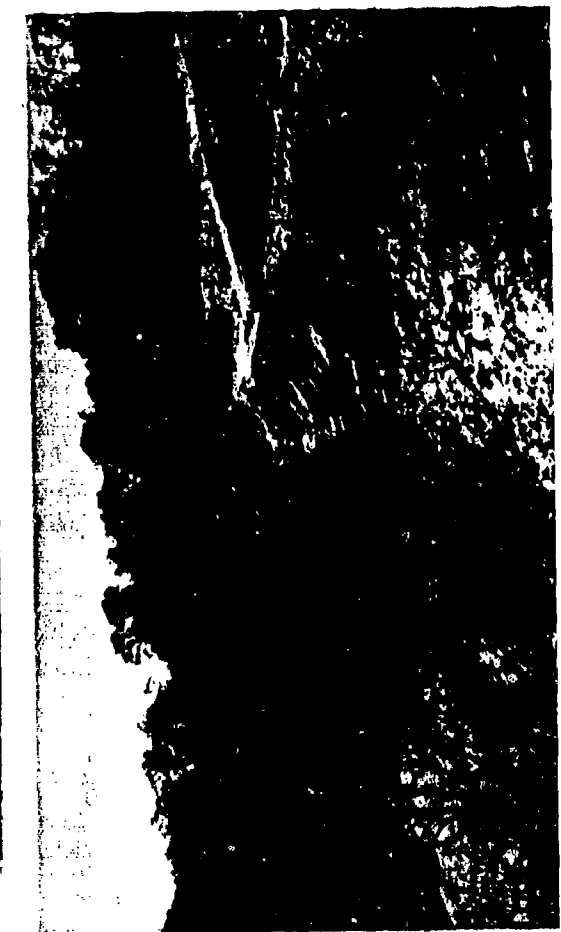
HARMAR REFUSE BANK



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13



C5

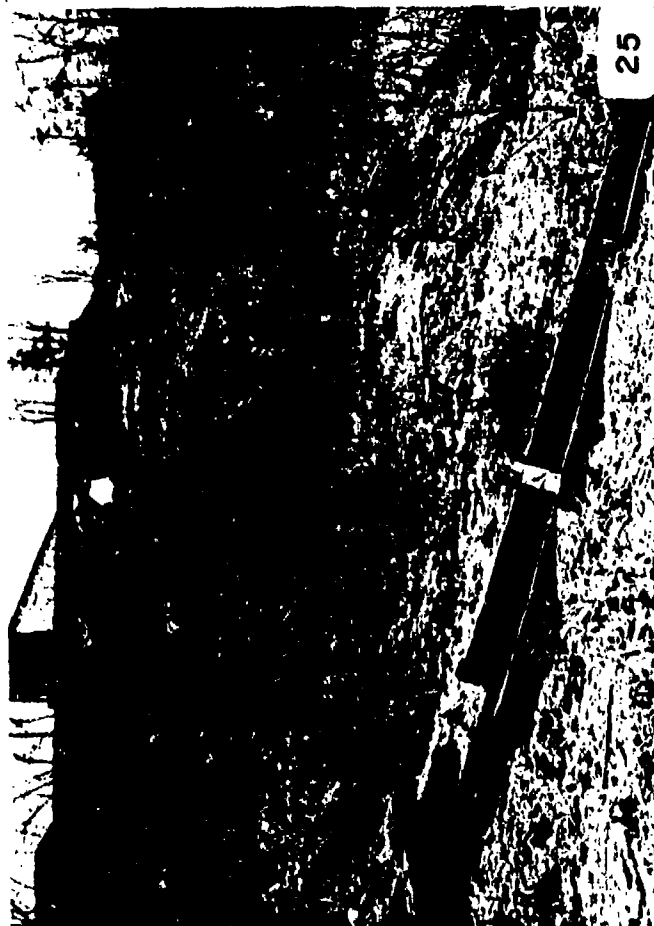
HARMAR REFUSE BANK



HARMAR REFUSE BANK



HARMAR REFUSE BANK



HARMAR REFUSE BANK



### PHOTOGRAPH DESCRIPTIONS

- Photo 1 Impoundment Zone from crest of embankment.
- Photo 2 Upstream Slope from left abutment.
- Photo 3 Crest from right edge.
- Photo 4 Upper Right Groin, looking downstream.
- Photo 5 Crest and Upper Right Abutment.
- Photo 6 Downstream Slope, central portion from right abutment.
- Photo 7 Downstream Slope, central portion from access road.
- Photo 8 Downstream Slope, upper portion from below.
- Photo 9 Access Road, looking upstream from central portion of downstream slope.
- Photo 10 Eroded Area.
- Photo 11 Spring in eroded area shown in Photo 10.
- Photo 12 Drainage Ditch and Culvert along access road.
- Photo 13 Upper Right Abutment.
- Photo 14 Downstream Slope from access road.
- Photo 15 Downstream Slope, lower portion.
- Photo 16 Downstream Slope.
- Photo 17 Right Groin, central portion.
- Photo 18 Erosion in Right Groin, central portion.
- Photo 19 Spring in Right Groin.
- Photo 20 Erosion in right groin below spring shown in Photo 19 above.
- Photo 21 Slough on downstream slope near access road.
- Photo 22 Slough on lower downstream slope.
- Photo 23 Toe of Slough shown in Photo 22.
- Photo 24 Slough on a lower left abutment.

- Photo 25 Slough and Flume on lower downstream slope.
- Photo 26 Lower Downstream Slope and Toe.
- Photo 27 Lower Downstream Slope and Toe.
- Photo 28 Flume showing underseepage.
- Photo 29 Seepage Collection Pond and rock toe buttress.
- Photo 30 Seepage Collection Pond. Note springs below high water line.
- Photo 31 Downstream Hazards.
- Photo 32 Seepage from slough in adjacent hillside.

APPENDIX D  
HYDROLOGY AND HYDRAULICS  
ANALYSES



## APPENDIX D HYDROLOGY AND HYDRAULICS

**Methodology:** The dam overtopping analysis was accomplished using the systemized computer program HEC-1 (Dam Safety Version), July, 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. A brief description of the methodology used in the analysis is presented below.

1. **Precipitation:** The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Report No. 33" prepared by the U.S. Weather Bureau.

The index rainfall is reduced from 10% to 20% depending on watershed size by utilization of what is termed the HOP Brook adjustment factor. Distribution of the total rainfall is made by the computer program using distribution methods developed by the Corps.

2. **Inflow Hydrograph:** The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for reservoir routing.

The unit hydrograph is developed using the Snyder method. This method requires calculation of several key parameters. The following list gives these parameters, their definition and how they were obtained for these analyses.

<u>Parameter</u>	<u>Definition</u>	<u>Where Obtained</u>
Ct	Coefficient representing variations of watershed	From Corps of Engineers*
L'	Distance from centroid of watershed to outlet	From USGS 7.5 minute topographic map
Cp	Peaking coefficient	From Corps of Engineers*
A	Watershed size	From USGS 7.5 minute topographic map

\*Developed by the Corps of Engineers on a regional basis for Pennsylvania.

3. Routing: Reservoir routing is accomplished by using Modified Puls routing techniques where the flood hydrograph is routed through reservoir storage. Hydraulic capacities of the outlet works, spillways and the crest of the dam are used as outlet controls in the routing.

The hydraulic capacity of the outlet works can either be calculated and input or sufficient dimensions input and the program will calculate an elevation-discharge relationship.

Storage in the pool area is defined by an area-elevation relationship from which the computer calculates storage. Surface areas are either planimetered from available mapping or USGS 7.5 minute series topographic maps or taken from reasonably accurate design data.

4. Dam Overtopping: Using given percentages of the PMF, the computer program will calculate the percentage of the PMF which can be controlled by the reservoir and spillway without the dam overtopping.

5. Benchmark: Due to the lack of design drawings, the pool level was assumed to be at Elevation 1100.0. This was used as the benchmark for all field measurements performed for this Phase I investigation.

HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Predominately woodland and  
impoundment zone.

ELEVATION TOP NORMAL POOL  
(STORAGE CAPACITY): 1100 ± (209 acre-feet).

ELEVATION TOP FLOOD CONTROL POOL  
(STORAGE CAPACITY): 1150 ± (1,710 acre-feet)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1152.7 (measured) 1150.0 (assumed minimum)

OVERFLOW SECTION

a. Type None  
b. Elevation N/A  
c. Width N/A  
d. Length N/A  
e. Location Spillover N/A  
f. Number and Type of Gates N/A  
g. Side Slopes N/A

OUTLET WORKS

a. Type None  
b. Location N/A  
c. Entrance Inverts N/A  
d. Exit Inverts N/A  
e. Emergency Drawdown Facilities N/A

HYDROMETEOROLOGICAL GAGES

a. Type None  
b. Location N/A  
c. Records None

MAXIMUM REPORTED NON-DAMAGING  
DISCHARGE None reported

HEC-1 DAM SAFETY VERSION  
HYDROLOGY AND HYDRAULIC ANALYSIS  
DATA BASE

NAME OF DAM: Harmar Refuse Bank

NDI ID NO.  
PA 00835

Probable Maximum Precipitation (PMP)

24.0\*

Drainage Area

0.14 sq. mi.

Reduction of PMP Rainfall for Data Fit  
Reduce by 20%, therefore PMP rainfall

0.8 (24.0)  
=19.2 in.

Adjustments of PMF for Drainage Area (Zone 7)

6 hrs.	102%
12 hrs.	120%
24 hrs.	130%
48 hrs.	140%

Snyder Unit Hydrograph Parameters

Zone	24**
$C_p$	0.45
$C_t$	1.6
$L' =$	0.23 mile
$t_p = C_t (L')^{0.6}$	0.66 hour

Loss Rates

Initial Loss	1.0 inch
Constant Loss Rate	0.05 inch/hour

Base Flow Generation Parameters

Flow at Start of Storm	1.5 cfs/sq.mi=0.21 cfs
Base Flow Cutoff	0.05 x Q peak
Recession Ratio	2.0

\* Hydrometeorological Report 33

\*\*Hydrological zone defined by Corps of Engineers,  
Baltimore District, for determining Snyder's Coefficients  
( $C_p$  and  $C_t$ ).

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Job HARMAR REFUSE BANK Job No. 80130M  
Subject DATA INPUT  
Made By VEB Date 6/25/81 Checked SGM Date 27 June 81

### LOSS RATE AND BASE FLOW PARAMETERS

AS RECOMMENDED BY CORPS OF ENGINEERS, BALTIMORE DISTRICT

STRTL = 1 INCH  
CNSTL = 0.05 <sup>IN</sup>/HR.  
STRTO = 1.5 CFS/mi<sup>2</sup>  
QRCSN = 0.05 (5% OF PEAK FLOW)  
RTIOR = 2.0

### ELEVATION - AREA CAPACITY RELATIONSHIPS

BASED ON 1979 TOPO FOR MODIFIED CREST LOCATION

$A_{1100} = 21.6$  ACRES

$A_{1160} = 47.0$  ACRES

THEN

$\Gamma_{1100} = 2.6221$

$\Gamma_{1160} = 3.8679 \quad \Delta\Gamma = 1.2458 \quad \Delta\Gamma/\Delta E = 0.0208$

$A_{1120} \approx 29$  ACRES

$A_{1130} \approx 33.1$  ACRES

CORRECTING FOR OBSERVED SEDIMENTS

$A'_{1100} = 21.6 - 0.3(21.6) = 15.1$  ACRES

$A_{1120} = 29.0 - 0.2(21.6) = 24.7$  ACRES

$A_{1130} = 33.1$  ACRES

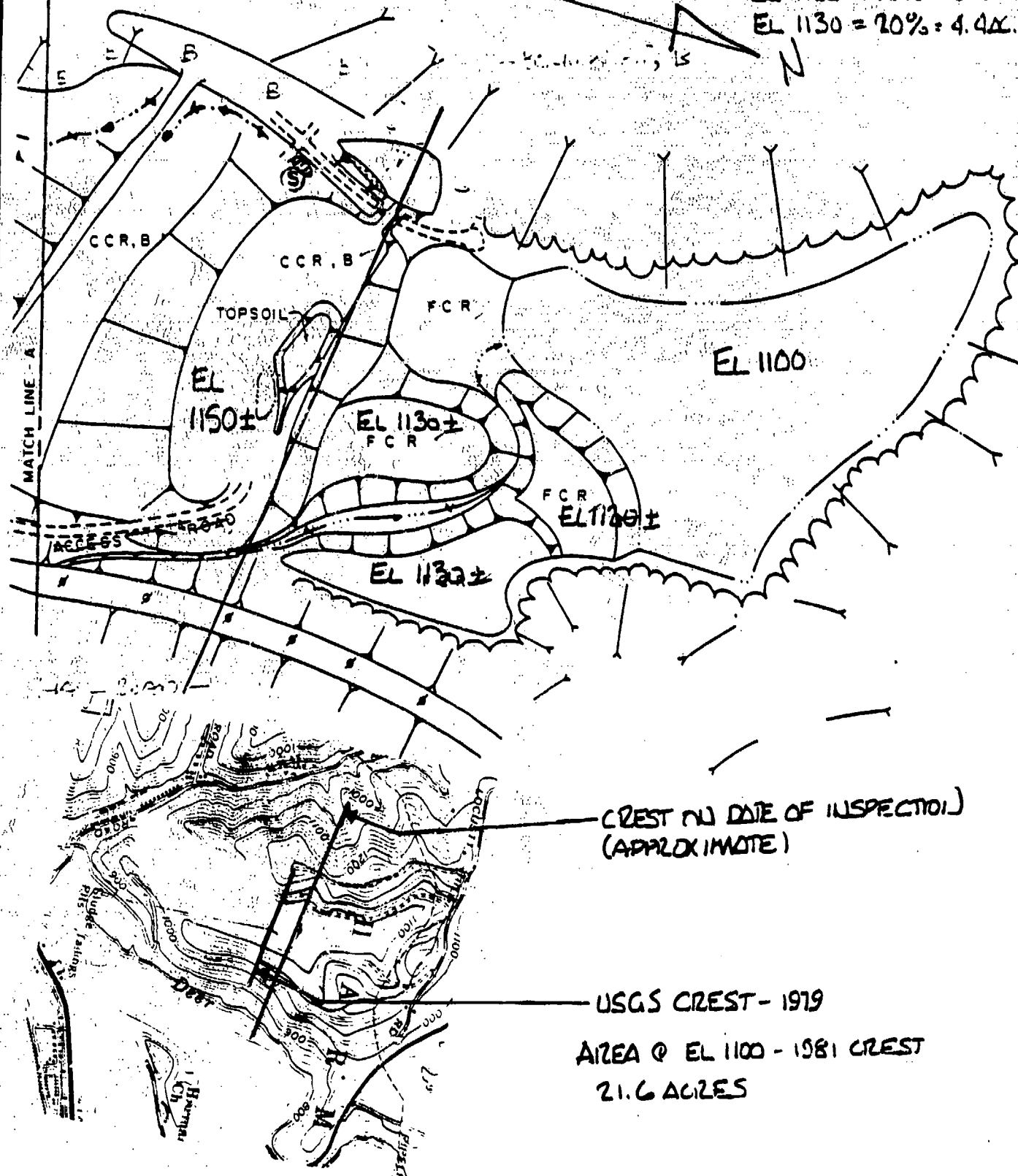
$A_{1160} = 47.0$  ACRES

# AREA-ELEVATION RELATIONSHIP

ASSUME:

EL 1120 = 10% = 2.2%

EL 1130 = 20% = 4.4%



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Job HARMON REESE BOUL Job No 8030M

Subject AREA-ELEVATION RELATIONSHIP

Made By JSB Date 6/25/81 Checked SGH Date 7/7/81

D6

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Job HARMAR REFUSE BANK Job No. 80130M  
Subject DATA INPUT  
Made By VEB Date 6/15/81 Checked ECW Date 27 JUNE 81

FROM NATIONAL DAM INVENTORY SHEET DATED 1980

NORMAL CAPACITY = 209 ACRE-Feet

USING CONIC METHOD OF CALCULATING  
RESERVOIR VOLUME :

$$H' = \frac{3V}{A} = \frac{3(209)}{21.6} = 29 \text{ FEET}$$

ELEVATION WHERE AREA IS EQUAL TO ZERO :

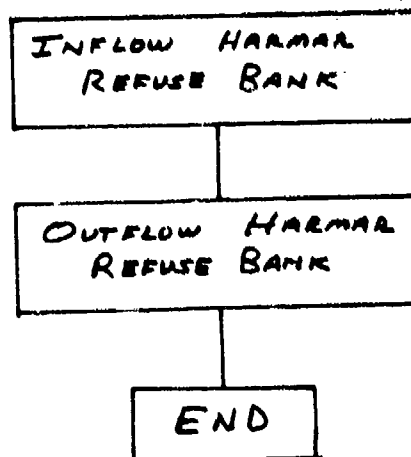
$$1100 - 29 = 1071$$

\$A	AREA	0	15.1	24.7	33.1	47.0
\$E	ELEVATION	1071	1100	1120	1130	1160

### OVERTOP PARAMETERS

TOP OF EMBANKMENT = 1150  
LENGTH OF EMBANKMENT = 900 FEET  
COEFFICIENT OF DISCHARGE = 3.09

### PROGRAM SCHEDULE



\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 \*\*\*\*\*

1	A1	NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS									
2	A2	HYDROLOGIC AND HYDRAULIC ANALYSIS OF HARMAR REFUSE BANK									
3	A3	PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD									
4	B	300	0	10	0	0	0	0	0	0	0
5	B1	5									
6	J	1	2	1							
7	J1	1	.5								
8	K	0	1								
9	K1	INFLOW HYDROGRAPH FOR HARMAR REFUSE BANK									
10	M	1	1	0.14		0.14					
11	P		24.0	102	120	130	140				
12	T							1.0	.05		
13	W	0.66	0.45								
14	X	-1.5	-0.05	2.0							
15	K	1	2								
16	K1	ROUTING AT HARMAR REFUSE BANK									
17	Y			1	1						
18	Y1	1									
19	\$A	0.	15.1	24.7	33.1	47.0					
20	\$E	1071.	1100.	1120.	1130.	1160.					
21	\$S	1100.0	.0001	.01	1.5						
22	\$D	1150.0	3.09	1.5	900.						
23	K	99									
24	A										
25	A										
26	A										
27	A										
28	A										

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
END OF NETWORK	

\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 \*\*\*\*\*

RUN DATE: 27 JUN 81  
 RUN TIME: 9. 4.27

NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS  
 HYDROLOGIC AND HYDRAULIC ANALYSIS OF HARMAR REFUSE BANK  
 PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD

JOB SPECIFICATION									
NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	10	0	0	0	0	0	4	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED  
 NPLAN= 1 NRTIO= 2 LRTIO= 1

RTIOS= 1.00 0.50

\*\*\*\*\*

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH FOR HARMAR REFUSE BANK

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0
HYDROGRAPH DATA								
IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME
1	1	0.14	0.0	0.14	0.0	0.0	0	1
								0



PRECIP DATA  
 SPFE PMS R6 R12 R24 R48 R72 R96  
 0.0 24.00 102.00 120.00 130.00 140.00 0.0 0.0  
 TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA  
 LROPT STRKR DTKR RTIOL ERAIN STRKS RTIOK STRIL CNSTL ALSMX RTIMP  
 0 0.0 0.0 1.00 0.0 0.0 1.00 1.00 0.05 0.0 0.0

UNIT HYDROGRAPH DATA  
 TP= 0.66 CP=0.45 NTA= 0

RECESSION DATA  
 STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH 35 END-OF-PERIOD ORDINATES, LAG= 0.66 HOURS, CP= 0.45 VOL= 1.00  
 6. 24. 45. 59. 60. 52. 45. 38. 32. 27.  
 23. 20. 17. 14. 12. 10. 9. 7. 6. 5.  
 5. 4. 3. 3. 2. 2. 2. 1. 1. 1.  
 1. 1. 1. 1. 0.

END-OF-PERIOD FLOW  
 MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q

SUM 26.88 24.46 2.42 13215.  
 ( 683.)( 621.)( 61.)( 374.21)

\*\*\*\*\*

# HYDROGRAPH ROUTING

## ROUTING AT HARMAR REFUSE BANK

ISTAQ ICOMP IECON ITAPE JPLT JPRT INAME ISTAGE IAUTO  
 2 1 0 0 0 0 1 0 0  
 ROUTING DATA  
 GLOSS CLOSS AVG IRES ISAME IOPT IPMP LSTR  
 0.0 0.0 0.0 1 1 0 0 0  
 NSTPS NSTDL LAG AMSKK X TSK STORA ISPRAT  
 1 0 0 0.0 0.0 0.0 -1100. 0

SURFACE AREA= 0. 15. 25. 33. 47.  
 CAPACITY= 0. 146. 540. 828. 2023.  
 ELEVATION= 1071. 1100. 1120. 1130. 1160.

CREL SPWID COQW EXPW ELEV COOL CAREA EXPL  
 1100.0 0.0 0.0 1.5 0.0 0.0 0.0 0.0

DAM DATA  
 TOPEL COQD EKPD DAMWID  
 1150.0 3.1 1.5 900.

PEAK OUTFLOW IS 0. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 0. AT TIME 50.00 HOURS

\*\*\*\*\*

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

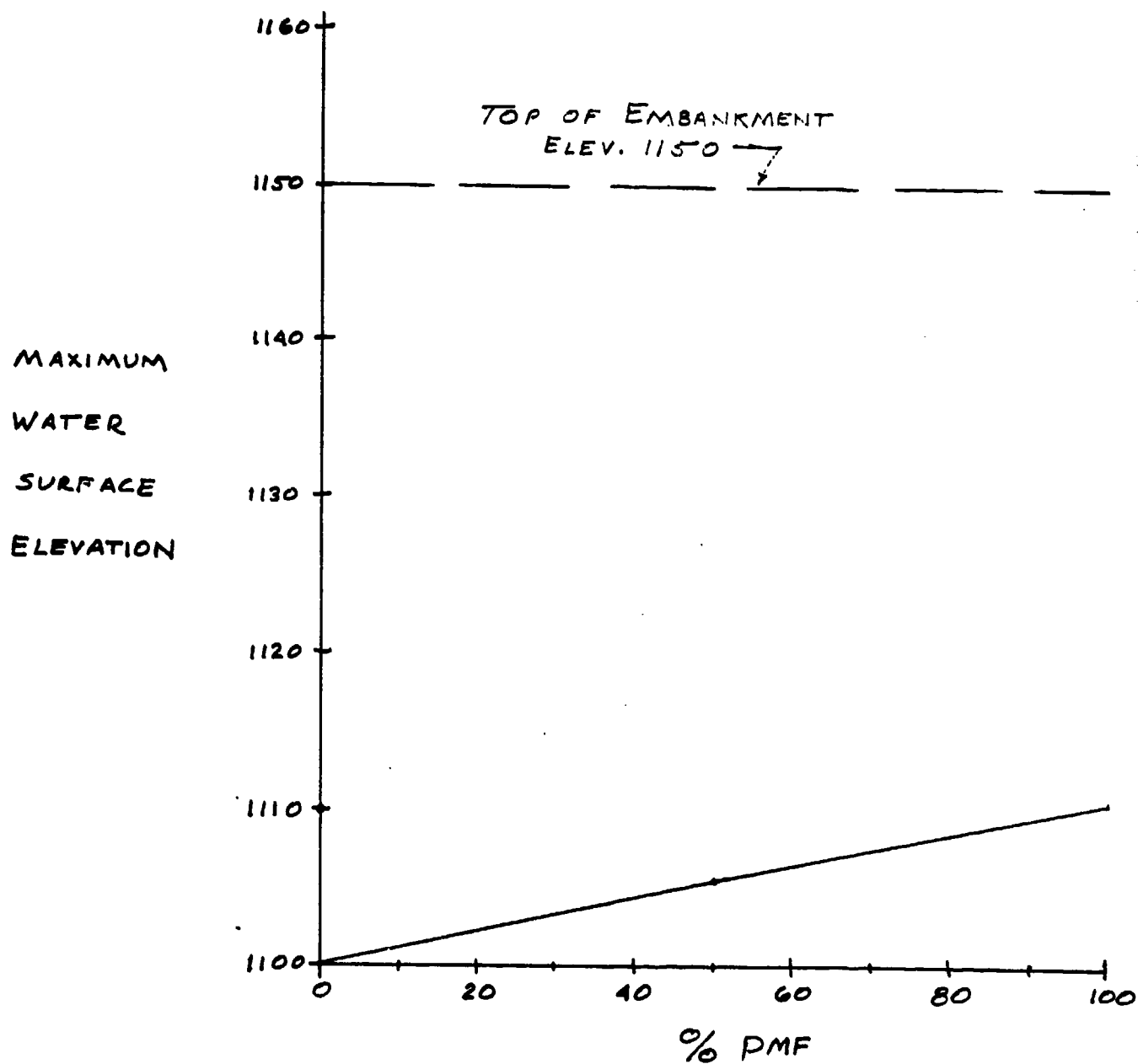
OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS	
				RATIO 1	RATIO 2
				1.00	0.50
HYDROGRAPH AT	1	0.14	1	507.	254.
	(	0.36)	(	14.36)	7.18)
ROUTED TO	2	0.14	1	0.	0.
	(	0.35)	(	0.00)	0.00)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....		INITIAL VALUE		SPILLWAY CREST		TOP OF DAM	
	ELEVATION		1100.00		1100.00		1150.00
	STORAGE		146.		146.		1578.
	OUTFLOW		0.		0.		0.
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1110.44	0.0	328.	0.	0.0	50.00	0.0
0.50	1105.56	0.0	237.	0.	0.0	50.00	0.0

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Job HARMAR REFUSE BANK Job No. 80138-M  
Subject HYDROLOGIC PERFORMANCE PLOT  
Made By SGM Date 26 June 81 Checked JFH Date 26 June 81



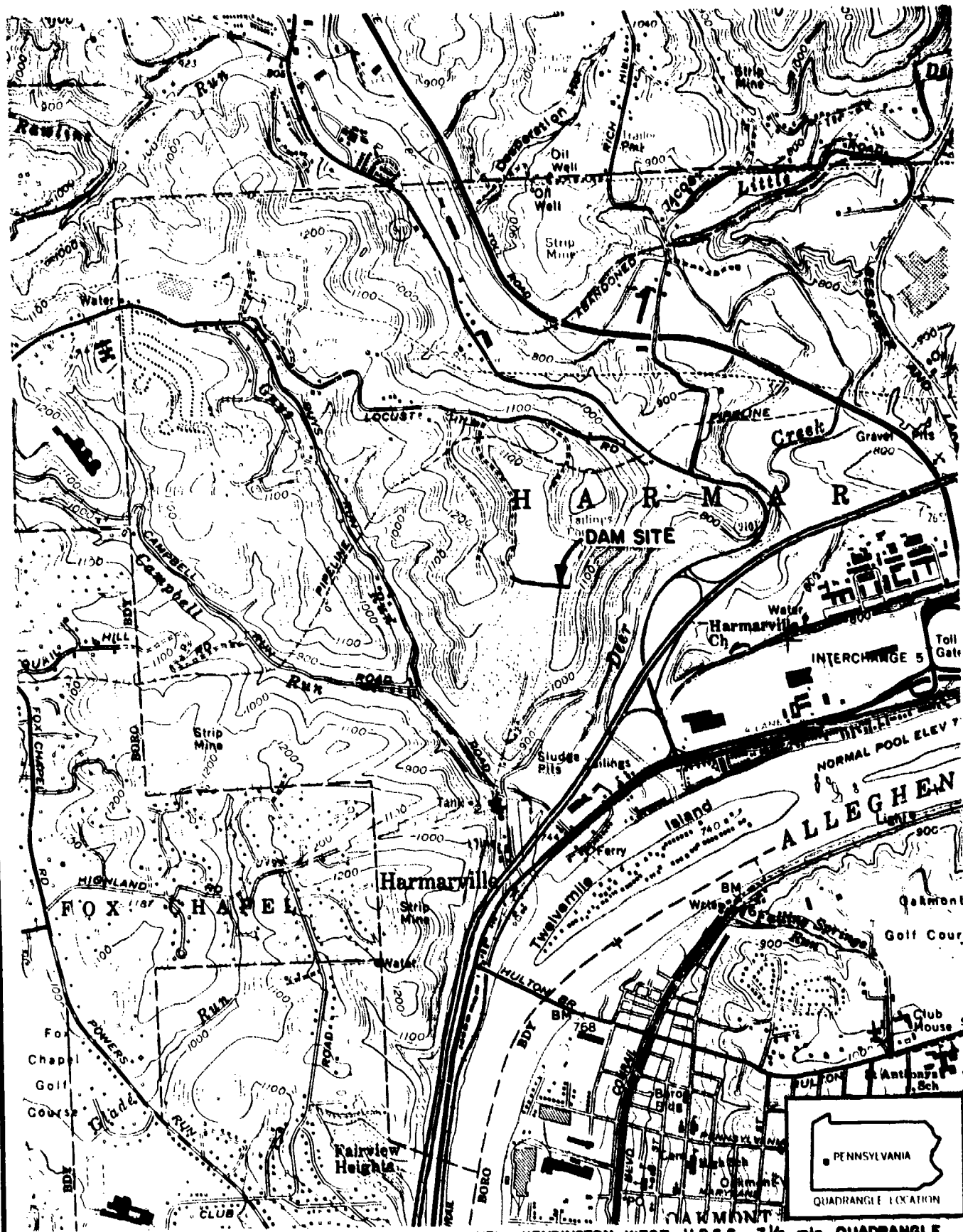
APPENDIX E

PLATES

LIST OF PLATES

Plate I

Regional Vicinity Map.



DATE: JULY 1981

SCALE: 1" = 2000'

DR: JF

CK: JEB

PLATE I

HARMAR REFUSE BANK

NATIONAL DAM INSPECTION PROGRAM

ACKENHEIL & ASSOCIATES

CONSULTING  
ENGINEERS

GEO SYSTEMS, INC.

1000 BANKSVILLE RD./PITTSBURGH, PA. 15216

REGIONAL  
VICINITY  
MAP

APPENDIX F  
GEOLOGY

## GEOLOGY

### Geomorphology

Harmar Refuse Bank is located within the Pittsburgh Plateau section of the Appalachian Physiographic Province. This region is characterized by gently folded sedimentary rocks which have been deeply cut by streams to form steep sided valleys. The dam is located on a small unnamed tributary to Guys Run. Hilltops in this vicinity lie between elevations 1200 feet and 1300 feet. Relief between these rounded hilltops and Guy's Run is approximately 400 feet.

### Structure

The site lies on the western flank of the McMurray Syncline, a northeast-southwest trending structure which plunges to the northeast. Rock strata in the vicinity of the dam dip to the northwest at a rate of about 0.5 degree. No major faulting has been documented in the area of the dam and no observations were made that would indicate faulting in the rocks outcropping around the site.

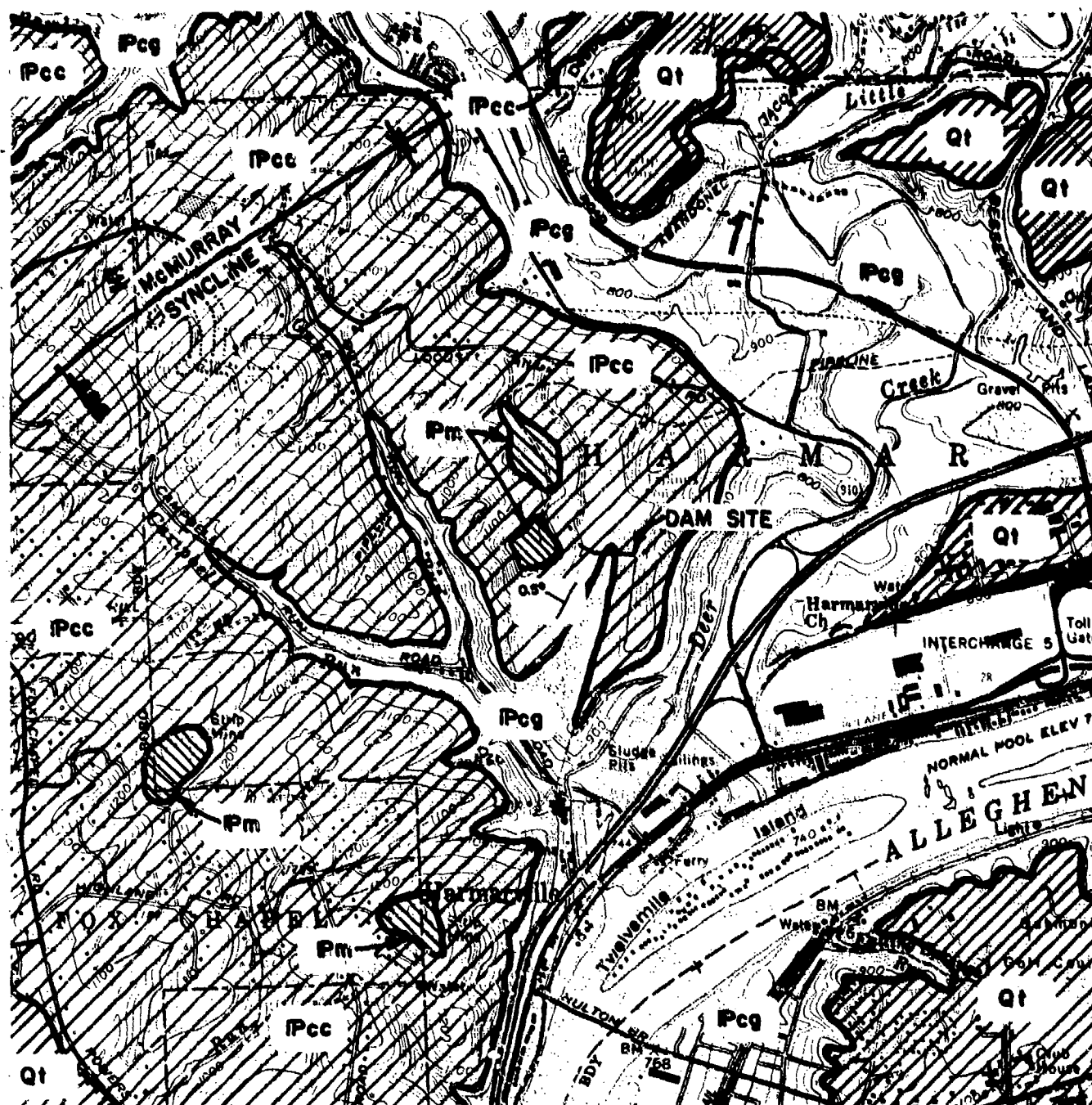
### Stratigraphy

Rocks outcropping in the area of the dam belong to the Glenshaw, Casselman and Monongahela Formations which are all of Pennsylvanian Age. These formations consist of cyclic sequences of sandstone, shale, red beds, thin limestone and coal. The Ames Limestone, a highly fossiliferous marine limestone, marks the top of the Glenshaw Formation, while the Pittsburgh Coal marks the bottom of the Monongahela Formation. A notable rock type in the Glenshaw and Casselman Formations is the landslide-prone red clayshale. Known locally as the "Pittsburgh Red Beds", these rock strata may be responsible for the ancient landslides common in this rock sequence.

### Mining Activity

The Upper Freeport Coal Seam lies approximately 300 feet beneath the dam and is possibly affected by deep mining. The Pittsburgh Coal Seam outcrops in the hilltops to the east and south of the site and, for the most part, has been removed by strip mining.





# NEW KENSINGTON WEST QUADRANGLE, ALLEGHENY COUNTY, PENNSYLVANIA

SCALE: 0 1/4 MILE 1:24000  
 CONTOUR INTERVAL 20 FT. DATUM IS MEAN SEA LEVEL  
 ——— FORMATION CONTACT

DATA OBTAINED FROM PENNSYLVANIA TOPOGRAPHIC AND GEOLOGIC SURVEY GREATER PITTSBURGH REGION GEOLOGIC MAP AND CROSS SECTIONS, 1975 and GREATER PITTSBURGH REGION STRUCTURE CONTOUR MAP, 1975

DATE: JULY 1981		HARMAR REFUSE BANK		GEOLOGIC MAP
SCALE: 1" = 2000'		NATIONAL DAM INSPECTION PROGRAM		
DR: JF	CK:	ACKENHEIL & ASSOCIATES CONSULTING GEO SYSTEMS, INC. ENGINEERS		
		1000 BANKSVILLE RD./PITTSBURGH, PA. 15216		

AGE	WCSO	Z-HECTH	COLUMNAR SECTION	PROMINENT BEDS
QUATERNARY		Q1		PLEISTOCENE GLACIAL OUTWASH, RIVER TERRACE DEPOSITS AND ALLUVIUM
PERMIAN	DUNBAR (P-1)	WASHINGTON LIMEZONE (P-2)		UPPER WASHINGTON LIMESTONE
		WASHINGTON COAL (P-3)		WASHINGTON COAL
		WAYNESBURG SANDSTONE (P-4)		WAYNESBURG SANDSTONE
		WAYNESBURG COAL (P-5)		WAYNESBURG COAL
PENNSYLVANIAN	MORGANTOWN (P-6)	UNIONTOWN SANDSTONE (P-7)		UNIONTOWN SANDSTONE
		UNIONTOWN COAL (P-8)		UNIONTOWN COAL
		BEDWOOD LIMESTONE (P-9)		BEDWOOD LIMESTONE
		SEWICKLEY COAL (P-10)		SEWICKLEY COAL
	CO-ITINUM (P-11)	PITTSBURGH SANDSTONE (P-12)		PITTSBURGH SANDSTONE
		PITTSBURGH COAL (P-13)		PITTSBURGH COAL
		CONNELLSVILLE SANDSTONE (P-14)		CONNELLSVILLE SANDSTONE
		MORGANTOWN SANDSTONE (P-15)		MORGANTOWN SANDSTONE
	GLENNDALE (P-16)	AMES LIMESTONE (P-17)		AMES LIMESTONE
		PITTSBURGH REDBEDS (P-18)		PITTSBURGH REDBEDS
		SALTSBURGH SANDSTONE (P-19)		SALTSBURGH SANDSTONE
		NAHOMING SANDSTONE (P-20)		NAHOMING SANDSTONE
ALLEGHENY (P-21)	UPPER FREEPORT COAL (P-22)		UPPER FREEPORT COAL	
	UPPER KITTIMING COAL (P-23)		UPPER KITTIMING COAL	
	WORTHINGTON SANDSTONE (P-24)		WORTHINGTON SANDSTONE	
	LOWER KITTIMING COAL (P-25)		LOWER KITTIMING COAL	
POTTSVILLE (P-26)	HOMERWOOD SANDSTONE (P-27)		HOMERWOOD SANDSTONE	
	MERCER SANDSTONE, SHALE & COAL (P-28)		MERCER SANDSTONE, SHALE & COAL	
POTTSVILLE (P-29)	CONNOQUENESSING SANDSTONE (P-30)		CONNOQUENESSING SANDSTONE	
MISSISSIPPIAN	POTTSVILLE (P-31)	BURGESS SANDSTONE (P-32)		BURGESS SANDSTONE
		CUYAHOGA SHALE (P-33)		CUYAHOGA SHALE
		BEREA SANDSTONE (P-34)		BEREA SANDSTONE